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LAST WEEK we quoted the remarkable furnace records of the South Chicago Works, and in recording a consumption of 1842 pounds of coke to the ton (2240 pounds) of pig-iron produced, we thought Superintendent Potter had reached very near the limit; we were mistaken. Last week's furnace work was better, in fact, the best yet:

Furnace	No. 5	made	1,449	tons of pig on	1,776	pounds coke per ton of iron.
"	No. 6	"	1,394	" "	1,759	" "
"	No. 7	"	1,413	" "	1,800	" "
"	No. 8	"	1,255	" "	1,867	" "
			5,510		1,799	

KENTUCKY BONANZAS.

The mineral resources of Kentucky, to a description of which so large a space is devoted in this issue of the JOURNAL, are well worthy of the attention of our readers. Kentucky is by nature, beyond all question, one of the most highly favored States in this country. It possesses a superb climate, where the Anglo-Saxon race can attain its maximum development free from the stunting influence of the severe climate of the far north and from the annealing effect of southern heat. It is the finest cattle growing portion of the United States; every hill side is watered with living springs, and even its forest covered hills are green with the famous Kentucky "blue grass." It can probably grow better stock and feed more cattle to the acre of land the year through than can any other portion of this continent.

Unlike most of our mineral districts, which are more or less sterile, this Kentucky blue grass country is underlaid with coal in perhaps greater quantity and of as good quality as any of our other great coal-bearing fields. Professor PROCTOR, in an extremely interesting manner, describes on another page the vast mineral resources of this favored state, and calls attention to the fact that they are now for the first time being made accessible and available by the building of several important railroads.

Yet with all these unsurpassed or even unequaled advantages in natural wealth and nearness to market, Kentucky grazing and mineral lands can be purchased cheaper to-day than can much inferior land in far distant States and Territories. The holding of wild land in immense estates and the unsatisfactory condition of many land titles have kept back the development of these great natural resources and have heavily depreciated the market value of the land. These drawbacks are now rapidly disappearing, and there are certainly few places on this continent that to-day offer as great opportunities for the profitable investment of capital as do the mineral, grazing, and timber lands of Kentucky.

THE LAW OF THE LAND FOR WORKMEN AND EMPLOYERS.

It is very surprising how the same question will come up again and again, after it has been authoritatively settled, in the never ending controversy between labor and capital, employers and employed.

One of these oft settled and oft recurring questions is the rights of capital to employ whom it will, or the justice of the action of labor associations in dictating who the employer may hire and who must not be permitted to work.

After the long strike of the Wyoming and Lackawanna coal miners in 1871, the questions in dispute were referred by both sides to the decision of arbitrators, and these being unable to agree the questions were submitted to the decision of the umpire, Judge WILLIAM ELWELL, of Bloomsburg, Pa., a gentleman who enjoyed the confidence and respect of the entire community as a learned and upright judge and worthy citizen. His decision, given in our "History of the Sliding Scale System of Profit-Sharing" on another page, should be read and carefully considered by each side in the present Lehigh strike.

Judge ELWELL laid down the law of the land in plain and unmistakable language, and if our labor associations and some employers were to make note of it much suffering and loss would be avoided. There is no law to justify, and should be no room in this free country for the unjust and cowardly "boycott." Every man has the right guaranteed him under the law (and it should in no case be abridged by any combination of his fellow workmen or fellow employers) to dispose of his labor as he may deem to his advantage, and to employ whom he may wish. The right of workmen to unite is unquestionable, but they have no right to prevent any one who does not belong to their association from getting work on any terms he may deem acceptable. Neither can employers refuse to employ union men as such, though there is nothing to oblige them to employ any man who is incompetent simply because the union demands it.

Judge ELWELL'S decision is the law of the land to-day as it was in 1871, and we commend it "to those whom it may concern."

THE DEVELOPMENT OF THE AMERICAN CHEMICAL INDUSTRY.

The immense natural resources of this country and the rapid development of manufacturing industry in many departments which until recently looked exclusively to foreign countries as our sources of supply, indicate clearly our destiny as a great manufacturing nation, which will not only supply its domestic wants, but will eventually compete with other countries in supplying the open markets of the world.

In the production of the minerals and metals this country has made phenomenal progress, which has already placed it at the very head of the list in the production of copper, lead, iron, steel and some other metals, and second in that of coal, where we will no doubt become first before very many years shall have passed. Nevertheless, there are some branches of industry that we have sadly neglected, and in which we have allowed

foreign manufacturers to hold almost undisputed control of our market. The chemical industry is, perhaps, the most important of these.

As the representative of the mineral industries on which the chemical industry rests, and of which it is essentialy a department, the ENGINEERING AND MINING JOURNAL has undertaken the much needed work of investigating the scientific, practical and economic questions which lie at the foundation of chemical manufactures.

In pursuit of this important object, we have been so fortunate as to secure the co-operation of the able and highly qualified industrial chemist. Dr. FRANCIS WYATT, whose valuable articles are now in course of publication in these pages. The commercial importance of the subject may be judged from the simple statement of our imports of foreign chemicals given by Dr. WYATT, while the vast abundance of the minerals from which these chemicals are the first derivatives, and the practical skill and ingenuity of our people, in adapting means to unusual conditions, will unquestionably lead to the establishment here of chemical manufactures on a befitting scale, to supply our domestic market. The great success of some works, already established, indicates what intelligent enterprise may accomplish.

In order to do full justice to this important subject, we have invited, and are promised, technical contributions from many of the most eminent scientists and chemical manufacturers in Europe. These communications will prove of the very highest value; the applications of the information given by them to the conditions surrounding the industry here being made by so competent an expert as Dr. WYATT.

The result of our enterprise will, we hope, be the building up of a great industry and the extending of the markets for our mineral products.

OUR EXPORT TRADE.

Our manufacturers have been so accustom ed to finding a good market at home for their products that less attention than is desirable has been paid to the extension of their foreign trade; nevertheless, the great superiority of many articles of American make has created for them a wide and rapidly increasing foreign demand. Mexico, South and Central America, South Africa, and the Australian colonies are among our best customers. Canada we already look upon as a home market.

South Americans will probably continue to be more permanent though at present less important customers for us than are the Australians, who are too "Yankee" to remain long indebted to any foreign country for what they can themselves produce. They buy our stamp mills and some other articles only to imitate them in their own machine shops; but there is always something which can not be imitated and which characterizes American machinery, namely, the embodiment of the lessons of experience. In mining machinery and appliances, there can be no set type best adapted to all conditions, and those who simply copy an American stamp mill may be very far from securing American practice. There are modifications from the main type which are suggested by experience in the treatment of each different kind of ore, and it is this varied experience, and the characteristic genius in adopting suitable means in the solution of new problems, which give rise to those variations in details which alone enables the person to attain the best and latest American results.

From the British Consular reports, as published in *The Engineer*, we find that American exports to Chili have increased in the ten years, 1875 to 1885, 43·8 per cent, being exceeded in percentage only by the growth of German exports. Among the articles in which we show a large increase are agricultural implements, 356 per cent increase; carpenters' tools, 85 per cent; hardware, 391½ per cent; iron nails, 56½ per cent; machinery, 196 per cent; plows, 35½ per cent; thrashing machines, 13½ per cent; wire nails, 800 per cent. These figures show a very gratifying growth in a but slightly cultivated field.

In Australia and South Africa we have made great progress, the more enterprising people being wisely desirous of obtaining "the best" of everything. The pages of the ENGINEERING AND MINING JOURNAL are constantly telling of the sending of quartz mills, Krom's steel crushing rolls, concentrating machinery, smelting plant tools of all kinds, and American experts to manage these things, to all the Australian colonies—the two great Australian bonanzas, the Mount Morgan gold mine, and the Broken Hill silver lead mines being among our largest customers—South Africa, the rich gold mines of the Transvaal in particular, are getting mining machinery in this country, and from all sides comes testimony to the fact that American machinery, tools, and appliances, when purchased through responsible houses, are more reliable and give far better economic results than those made in any other country.

In the *Australasian Ironmonger* we note long lists of American goods which are highly commended; among these are saws, spades, shovels, picks, weighing machines, Rand rock drills, "the most popular drill in New Zealand and, perhaps, in the other colonies," rackarock, axes, Worthington's steam pumps, mill machinery, American stoves, "always growing in popularity," tram cars, barb wire, lager beer, and innumerable other articles.

There are numerous references in our Australian exchanges to the great mining records, almost equaling our own, made with the Rand Slugger drills and rackarock; in fact, we have before us a list of no less than thirty-one different parties in New South Wales, Victoria, Tasmania and Queensland, that are using these deservedly popular American drills and explosives.

These gratifying indications that a growing interest in foreign markets is being taken by our manufacturers come to us from all parts of the world, and the inquiries addressed to us concerning mining, milling, and smelting appliances show that those engaged in the industries the ENGINEERING AND MINING JOURNAL represents, are everywhere looking to us for the best and most economical practice, and offering to our manufacturers a friendly invitation to treat with them. To all such communications it is always a pleasure to us to respond, as it is to any inquiry connected with the great industries we represent.

THE SOURCES AND VALUES OF THE RARER METALS—II

If the rarer metals of the Aluminium group, Cerium, Didymium, erbium, gallium, indium, lanthanium, thorinum, yttrium, and zirconium, have received more attention than many of the others, it is probably because aluminum itself will so amply reward the many investigators who are devoting themselves to its industrial production. The majority of them are, however, still so exceedingly rare that our acquaintanceship with their properties does not extend beyond the knowledge that they all combine with chlorine, in the proportion of 3 to 1, to form chlorides, and with oxygen, in the ratio of 2 to 3, to form oxides.

There are few metals more plentifully and widely dispersed over the entire surface of the earth's crust than aluminum; there are none which have hitherto proved so difficult and so costly to extract from their ores. On the other hand, so soon as its extraction has been sufficiently simplified to place it on a par with iron, no metal will render more important services to mankind. The actual stage of our progress in the direction of this simplification has been so regularly chronicled in the columns of the ENGINEERING AND MINING JOURNAL, and is so thoroughly well known, that all details at this juncture, are unnecessary. Its mode of production by the "sodium process" has always been costly and tedious; and, despite the invention of Mr. H. Y. CASTNER for facilitating its manufacture, by cheapening the cost of sodium, is not likely to gain very much extension. The Cowles process obtains it as an alloy in a far simpler and more direct manner and at a much lower cost, but has not yet succeeded in producing it pure upon an industrial scale. The fact, therefore, remains that its actual market value is $12 per pound, and there can be no doubt that while this continues, its adaptation to common or generally useful purposes must be limited.

Only a very few years ago it was looked upon by many prominent chemists as a most advantageous and suitable substitute for the noble metals, gold and silver, either as a higher coinage medium or in the manufacture of jewelry and trinkets; and we have certainly seen that, from some points of view, it would be applicable to these purposes. It has a very beautiful appearance, emits a clear and ringing sound when struck, may be beaten into a sheet or drawn into a wire, and is not very flexible, and has a tenacity between that of zinc and tin. It is little influenced by oxidizing agents, is entirely unaltered by exposure to the air at an ordinary temperature, and is but little changed at a very high heat. As against all these qualities, however, it has the very serious drawback of being soluble in both acids and alkalies, and of entirely losing its value, directly it is dissolved. It thus differs from gold and silver in the essential point to which both of these owe so much of their importance; proof against destruction by any exterior influence save that of ordinary wear and tear.

Gold or silver, when dissolved in the strongest acids, merely undergo a chemical change, from which, by the easiest of processes, they may be brought back intact to their primitive state; whereas, aluminum if once transformed into a compound, can only be again reduced, by repeating the whole complicated and costly operation which now presides over its birth. It is, therefore, natural to assume that its most extensive application will ever be in the form of an alloy, and that its greatest services will be rendered as a factor in the composition of wire, machinery, castings, sheets, gun metal, armor plates and other uses requiring great strength and high elastic limits.

Of the other members of the group, thorinum is obtained from the Norwegian mineral *Thorite*, while cerium, didymium, erbium, lanthanium, and yttrium are all derived from the silicates *godolinite* and *cerite;* but they are so extremely rare, have, in fact, only been experimented upon in such comparatively minute quantities, that it would be futile to express any opinion as to their probable utility, for we have no reliable data as to their various properties.

Gallium and indium are found in very minute quantities in some special kinds of blende, the former being extracted in the form of a basic

sulphate, which, when dissolved in a solution of potash and decomposed by the galvanic current, yields up the metal as a deposit at the negative pole. It is a hard, white, and bright, metal, which fuses at an extremely low temperature. If momentarily held in the hand it will rapidly melt, but, if touched with a piece of the solid metal, the molten mass immediately solidifies. Its nominal price is $3250 per ounce.

Indium owes its name to the line of indigo blue which it produces in the spectrum, and were it not for its much higher specific gravity might easily be mistaken for gallium. At 350 degrees Fahr., it commences to fuze; and at a bright red heat, it burns with a lovely and dazzling flame of violet blue. No use has yet been found either for the metal or its salts, but it must be added that it has never been thoroughly investigated, and that we have still every thing to learn of its peculiar properties. It is quoted at the price of $150 per ounce, and being hence about 20 times cheaper than gallium, we may infer that it is proportionately more plentiful, that being the only apparent reason for this enormous difference.

The remarkable characteristics of zirconium have earned for it a great deal of attention in the scientific laboratory, and there is some probability—despite its rarity and the fact that it is now sold at the high price of $240 per ounce—that it may yet be the object of some valuable discovery.

Its origin is in the minerals *zircon* and *hyacinth*. It has a similar appearance to amorphous silicon, and while it has thus far proved to be infusible at the very highest attainable heat, it yet gently decomposes water at the boiling point. When its oxide, Zirconia, has been made into a paste with water and boracic acid, and has been baked in a very hot fire, in iron molds, it forms hard masses, which burn in the flame of the oxyhydrogen blow-pipe with a luminosity and brilliancy far surpassing that of calcium and known as the zirconia light.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
All letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents

Professor Egleston's Metallurgy.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I heard much unfavorable criticism of Professor Egleston's Metallurgy before I had seen the book, and thought the statements made might be unjust and too severe, but I have now perused it and I must confess that the sarcastic statements were only too well merited, and that a review of the book can not be severe enough.

A confused tangle of valuable and worthless facts and statistics, of truth and fiction, of many errors, misstatements, and contradictions, such is the book written by the Professor of Metallurgy of our most prominent mining school. It is one of the worst technical treatises I have ever read. Only too frequently there is proof that the author has not mastered and comprehended the subject upon which he is writing. His style is without lucidity and arrangement, and the presentation of the matter is careless and unsystematic. There is also much useless repetition. Such a book is a disgrace to the author and to the school he represents, an insult to the profession, and a snare to the student who seeks reliable information. METALLURGIST.

Gold Mining in Russia.

EDITOR OF THE ENGINEERING AND MINING JOURNAL:

SIR: I take the liberty of writing to you, knowing that you take an interest in all mining matters, and because I wish that American experience and skill may be introduced into Russia, where an enormous field is open to enterprising men in gold, silver, and other metal mining. To commence with gold mining, I beg to state that quartz milling is quite in its infancy on the Oural, enormous amounts of the precious metal being lost through the *very* primitive appliances. *The tailings of 15 mines have been analyzed by Professor Tossa and found to contain from two to eighteen ounces per ton*, whereas the owners are getting a good deal less. You will readily understand that the reason thereof is the pyritic and arsenical character of the quartz. What we want is the erection of leaching and chlorination works, and if a syndicate could be formed for the erection of such works on such places as I could design, such syndicate would get *fabulous profits*.

I have heard that the stamps for pulverizing have lately been superseded by rolls; would you be so kind as to give me some details about this matter?

These machines are sure to make a revolution in our mining appliances if they prove as good as they are said to be.

Last year a small leaching works was erected on the Oural on the Mears principle, and after six months' working 8 poods of gold value about two hundred thousand roubles, viz., over one hundred thousand dollars, were obtained from the tailings. This fact speaks for itself.

Yours very truly, N. LATENER.

12 Rue Gorochowaya, ST. PETERSBURG, Russia, Oct. 27, 1887.

The Wild Speculation in Copper at the New York Metal Exchange.

EDITOR OF THE ENGINEERING AND MINING JOURNAL:

SIR: When this journal, several months ago, up to the middle of October, advocated that, with a reduced production and a good consumption, Lake copper was cheap at 10¼ to 10½ cents per pound, neither mine owners, nor consumers, nor speculators paid much heed. Since then the price has advanced constantly, and has reached 12¼@12½ cents per pound, not alone, however, by an increased consumption in this country, but especially during the last two weeks by speculative purchases. It is a fact that nearly twelve million pounds of Lake copper are held "on margins." By putting up $150 margin for each 25,000 lbs. of copper, millions of pounds have been bought for future deliveries by Boston and New York speculators. This copper is carried by banks and by dealers, and the speculators expect consumers to take hold of it at further advanced prices in view of a large sale of Calumet & Hecla copper, which may happen almost any day. The question arises, whether this speculation is a sound and legitimate one. Last Saturday, and on almost every day since then, $\frac{35}{100}$ of a cent was paid for carrying charges from November 15th to January 1st, equal to almost *twenty per cent* per annum interest. This is rather a high premium for speculating in copper or any other article.

In 1885 the production of the United States, including that made from imported ores, was 171 million pounds of copper, prices going down to ten cents. Subsequent closing of several mines reduced the production in 1886 to 161 million pounds.

Notwithstanding the Calumet & Hecla fire I estimate this year's production by increased yield of the Tamarack, the Anaconda, the resumption of work on the Montana Copper Company's mines and others to be at least 165 million pounds; unsold stock January 1st, 1887, 23 million pounds; sold, but not delivered, stock January 1st, 1887, 15 million pounds; total, 203 million pounds.

	Million pounds.
Last year's consumption was about	123
Allowing an increase of 10% in 1887	12
And an export to Europe of	40
	175

we shall have a stock of 28 million pounds on hand by January 1st, or 40 millions if our consumption should be the same as last year.

The Calumet & Hecla, which formerly produced four, is now making five million pounds of copper per month. The Chambers mines at Butte, expect to produce in 1888 as much copper, say 40 million pounds, as the Anaconda does at present, the new smelter, an improved duplicate of the Anaconda, being almost completed.

The Boston & Montana Consolidated mines, making at present at the rate of 7 million pounds per annum, are erecting new works at Central Falls with a capacity of between 15 and 20 million pounds of copper.

The resumption of work on the Old Dominion mines at Globe, Arizona, capacity between 5 and 6 million pounds per annum, and of a host of other smaller mines at Lake Superior, in Montana and Arizona, will also add to our production.

Freights and treatment in the West have become cheaper during the last year, while prices here have advanced 25 per cent within a few weeks, and, in stimulating production, threaten to bring about a large over-production.

History repeats itself. The rise in November, 1886, from 10½ to 12 cents, was followed in the spring by a decrease of the material to 9¾ cents, with even a better and healthier condition of the market than exists at present.

As a matter of course speculation is not reasoning, but goes on blindfolded. S. R.

We think our correspondent considerably exagerates our production of copper this year and in the future, and at the same time understates our consumption. Our views on the market will be found in our regular trade report.—EDITOR ENGINEERING AND MINING JOURNAL.

NEW PUBLICATIONS.

THE METALLURGY OF SILVER, GOLD, AND MERCURY IN THE UNITED STATES. By Thomas Egleston, LL.D., Professor of Mineralogy and Metallurgy, School of Mines, Columbia College, New York. Published by John Wiley & Sons, New York, and *Engineering*, London. Two volumes. Vol. 1. Pages 558 and Index. Illustrated. Price $7.50.

Professor Egleston, in the preface to this work, states that he "has presented it to the public in the hope that it might give, up to this date, a reliable description of the condition of the metallurgy of gold, silver, and mercury in the United States, as well as the progress which has been made towards perfecting machinery and processes for their extraction."

This statement challenges the criticism of the profession, for it would be a manifest injustice to American metallurgists were the present condition of their art to be misrepresented.

There is no more important subject in metallurgy to-day than the treatment of gold and silver ores, and a faithful, connected record of the enormous progress made in it by American metallurgists during the past ten years would be invaluable. Even a full statement of the present condition of the art, showing, in practical working records, the unrivaled results attained here would be welcomed by the metallurgists of the entire world, for in mining and in most departments of metallurgy American practice can unquestionably claim pre-eminence in economic results.

To prepare such a work it is evident that the writer should possess a practical familiarity with his subject, as, indeed, should be the case with the author of any treatise that is intended to serve as a text-book for students and practical men. The want of this practical experience is painfully evident throughout Professor Egleston's pretentious work, and must be considered one of its chief, if not the foundation of all its defects.

The book commences with the old history of the discovery of gold in this country, the origin of the pan and cradle, long Tom and hydraulicking and much more pre-adamic information with which the entire world has been familiar from "time immemorial," in the mining sense at least.

It claims to be a treatise on the metallurgy of silver as practiced to-day, hence we may well question the appropriateness of devoting any part, much less about one third of its pages, to foreign subjects, such as gold mining, hydraulicking, effect of tails on river beds, descriptions of crushing machinery, rolls, stamps, etc., taken from manufacturers' circulars, and long descriptions of dismantled and abandoned works, and of furnaces that either were never built or that were abandoned years ago. But if there may still be a question as to the appropriateness of filling a book with even useful material which is foreign to its subject, there can

be no doubt whatever as to the worthlessness of many of the antiquated figures, quoted by Professor Egleston, or as to the positive injury which can be done to the profession of American metallurgists by such a compilation issued with the authority of Professor Egleston's high position, and claiming to represent present American practice.

The work not only does not represent actual American practice, but it is not, in any proper sense, even a treatise on the metallurgy of silver. It is simply a hodge-podge of metallurgical and other notes, which the Professor collected, for the most part years ago, and of copious extracts, made—for the most part without proper credit—from some valuable monographs contributed by others during the equally distant past to our technical periodicals and engineering societies. Had Professor Egleston's position been less eminent, less would have been expected from him, nor could his work have exercised so evil an influence upon students of the profession.

It is with the most sincere personal regret we feel called upon to speak in these severe terms, but our duty to the interests the ENGINEERING AND MINING JOURNAL represents, demand it, and in accordance with the opinion expressed by many of our most distinguished metallurgists, we can not remain silent. A work on this subject is greatly needed, but the profession can not afford to have the present condition of the art misrepresented.

The age of most of the information given by Professor Egleston is indicated by many things. He tells us that "Recent experiments have been made (in the treatment of gold ores) with nascent chlorine; with this gas under pressure, and other modifications which gave promises for the future which have not been fulfilled." The method here referred to was described in the ENGINEERING AND MINING JOURNAL in 1880, as then in use at the Phœnix mine, North Carolina, where it has since been, and is still in successful operation.

We are told that up to "within a few months" the stamp battery has been the only method of crushing ores used in California, and that the Ball or steam stamp, is capable of crushing 110 tons a day—while at the Osceola and Tamarack mines on Lake Superior they are crushing 200 tons a day.

A few old automatic ore samplers are given, but the later devices now in quite general use are not mentioned. The chapter on Zinc Desilverization contains much that is valuable, and although it copies some advertised price lists for ores in 1885, which, of course, no longer represent present rates or smelting charges, it nevertheless contains the latest information given in the book. Most of the details of treatment in this chapter relate to work done at the old Germania and Mansfield (Pa.) works in 1874 and described in the Mining Commissioners' early reports, and in an article by H. O. Hofman in the Mineral Resources of the United States, 1883.

The Brodie distillation furnace, described at length and illustrated (p. 100), has been out of use for years, and the Du Faur gas furnace, which is illustrated and described, has never been built. The practice of 13 to 15 years ago, we need not tell progressive engineers, has little value as a guide to-day.

Chapter III. is devoted to reproducing the old description of the Boston & Colorado Company's works, at Black Hawk, which were abandoned and dismantled years ago. Chapter IV., of about 74 pages, is devoted to crushing machinery (not silver metallurgy), and is compiled largely from the catalogues and price-lists and advertisements of interested manufacturers. Professor Egleston quotes from the annual reports of the companies the cost of stamping and concentrating native copper ores at the Lake Superior mines, in 1875–76. These reports are published every year, except where the works were abandoned, so there is no excuse for quoting figures of 12 years ago.

The cost of crushing and concentrating at the Allouez mill in 1875, given by Dr. Egleston to represent our present practice, was considerably over $1 a ton, while in 1885, which is not given, it was 44 cents; but this is scarcely more than a fair sample of these antiquated examples which are given to represent present American practice.

Chapter V. treats of roasting silver ores, and a dozen pages are devoted to illustrating and describing the old Brückner roasting cylinder, with diaphragm, which was abandoned years ago; and a number of interested "estimates" are given in place of actual working results for the cost of roasting ores.

The White-Howell furnace, the most extensively used of all the automatic furnaces in this country, is dismissed with a few days record made 16 years ago. A number of successful modern furnaces are not even mentioned. Chapter VI. is devoted to the Patio and Cazo process of amalgamation, as practiced chiefly in Mexico, and is a compilation without personal credit from some valuable though mostly old books and papers published in the reports of the U. S. Mining Commissioner, in the transactions of the Institute of Mining Engineers; in some foreign periodicals and, of course, in the ENGINEERING AND MINING JOURNAL.

This compilation is probably the most thorough and complete chapter in the book, though we believe the author has had no familiarity whatever with the practice described.

Barrel amalgamation is illustrated in Chapter VII. by an example from the Pelican Mill, Colorado, in 1874 (seventeen years ago).

Chapter VIII. gives pan amalgamation—the distinctively American method—from a few confused examples of work and prices in 1871, 1874 and 1875, and from Hague's report on the Comstock and some later figures, taken from papers published in the Transactions of the Institute of Mining Engineers. If these figures were accurate and represented modern practice, and if their authors were always cited they would be valuable, and their value would be recognized.

Chapter X. is devoted to leaching processes, a subject with which the author appears to have only the most distant and misty acquaintance, and which he has mixed up with descriptions of crushing machinery.

Before dismissing the book, let us illustrate from this, its last chapter, a few of the author's extraordinary statements. It would scarcely be an injustice to say that they fairly represent the quality of the rest of the volume.

On page 516 we are told that "with stamps it is not generally practicable to crush through a coarser screen than a No. 30."

On page 517, "Rolls have been successfully used for some time at the Ontario mill." As a matter of fact they are not used there.

On page 519 we see it stated that "the discharge pipes (of the lixiviation tanks) are made of rubber, and enter the bottom and rise in the tank and are kept in position by a float." The author has got lixiviating and precipitating tanks "mixed."

On page 520 we learn that "as the solvent power of the liquor for the precious metals is not increased by concentration, it must be made dilute." As a matter of fact, the solvent power of a hyposulphite solution for silver chloride increases in proportion to its concentration. We are also told on the same page that "lead is more soluble in cold than in hot solutions," while the exact contrary is the case.

On page 522 the author says "this extra solution is made by dissolving 18 parts of sodium hyposulphite and 10 parts of copper sulphate in a small quantity of water." This method has, we believe, never been used anywhere.

On page 526 we are told "the table on next page shows the effect of leaching by the two solutions." As the author had just been speaking of the Ziervogel process, we are surprised to find that the table referred to gives the results of lixiviating raw Leadville ores.

On page 528 Professor Egleston says: "The calcium, iron, manganese and zinc carbonates are also soluble," when the very reverse is true; they are *not* soluble.

We are told that soda ash "comes in sheet iron drums," etc., and costs 2½ cents per pound. "Once opened, it should not be left exposed, as it absorbs carbonic acid." The student might not know that caustic soda, and not soda ash, is intended here.

On page 530 the author says: "The sodium sulphide, besides, can be heated to 100 degrees without much detriment, as it decomposes slowly, while the calcium sulphide can only be heated to a low point without decomposing." This is an extraordinary statement, and probably refers to something else which has been lost in the chaos from which this book has scarcely emerged. Page 532: "Russell's process is now in use in * * * * the Ontario mill." It is not in use there, though there is a small experimental plant at the works.

At Bullionville, Professor Egleston tells us (p. 536), "this process has been in use since January, 1885," and "the capacity of the mill is 175 tons of raw tailings a day." He then devotes several pages to estimates of the cost of treating these raw ores (stated as though they were actual working results), while the facts are that the lixiviation of these raw tailings was a complete and disheartening failure and the process was abandoned some time ago.

Such is the incoherent and inaccurate compilation which Professor Egleston claims "presents up to this date a reliable description of the gold and silver metallurgy in the United States."

It is discreditable to its author and an offence to the profession, by which it has been received with almost universal indignation.

On another page will be found an expression of this general sentiment; it is written by one of our most distinguished metallurgists, a gentleman thoroughly versed and experienced in the subjects which Professor Egleston essays to treat.

THE DEVELOPMENT OF THE AMERICAN CHEMICAL INDUSTRY.

By Dr. Francis Wyatt.

(*Continued from Page* 346.)

The "ammonia" or Solvay process was first exploited on a large scale in about 1867 at Couillet, in Belgium, but, despite its apparent simplicity and many advantages, was found to be so costly that until 1880 it was impossible to produce by it a ton of refined alkali at less than $40. Since that date, however, new and efficient apparatus has been invented: all the working details have been improved, and so marvelous has been the onward stride that the tables are completely turned; it has thrust all others from position, and now stands even before Leblanc's as a producer of cheap soda. Thus severely assailed, it is lucky for the existence of the latter that it still possesses one advantage—and that one of incalculable value—over all its competitors. We allude to the production of bleaching powder, obtained by utilizing the waste chlorine generated in the manufacture of its salt cake. Without this, the deadly duel now being fought out in the alkali trade, instead of being continued until the owners of the ammonia-soda can combine with their process the cheap production of chlorine, would be of short duration. As it is, they are reported to be on the very brink of success, and no less than three methods are actually on trial. Solvay himself proposes to boil down his waste calcic chloride liquors to dryness and calcine the residue in a furnace with clay; Mond heats his residual ammonium chloride with oxide of nickel, distills off ammonia with formation of nickel chloride, and drives the chlorine from the latter by heating it in a current of air; while M. Pechiney, of Salindres (Gard), France, an extremely able and ingenious chemist, obtains a residue of magnesium chloride, from which he recovers the chlorine by the application of heat and steam.

The very first effect of the complete success of either of these methods, would be to bring down the price of bleaching powder, and immediately that occurs the Leblanc process, as it is now understood, must go out of existence. Meanwhile the old manufacturers are by no means idle, they do not intend to stand passively by and watch for developments; and even while we write, we hear of certain innovations resulting from the careful and laborious study of many prominent scientists which promise to open up for them a new lease of prosperity.

The foremost of these novelties is that relating to the recovery of sulphur from the "tank waste," to which Mr. A. Chance, of the firm of Chance Brothers, England, is now devoting his capital and well-known energy. His process, briefly outlined, consists in attacking the waste by carbonic acid under such conditions of temperature and pressure that the material is completely decomposed. The whole of the sulphur is liberated as sulphureted hydrogen, and the absorption of carbonic acid gas is complete. He, therefore, obtains on the one hand sulphureted hydrogen in a sufficiently pure state to be readily dealt with, and on the other a residue of carbonate of lime, which may be made use of over again. The hydrogen sulphide is collected in a gas holder sealed with a mineral oil, and burnt either for the production of sulphur or of sulphuric acid, by the ordinary methods.

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Another modification is that proposed by Messrs. Carey, Gaskell & Hurter, by which they will, while retaining the earlier portion of the Leblanc process for the manufacture of salt cake, entirely depart from it after that stage, and branch off into hitherto unexplored regions. To the practiced eye of the chemist, and from an experimental or "laboratory" point of view, their process is a beautiful and a simple one; but in its commercial application to the industry, it unfortunately appears to be surrounded by the greatest difficulties. They first heat their salt cake with sulphate of ammonia, by which ammonia is distilled off and a bi-sulphate of soda is formed ($Na_2SO_4 + (NH_4)_2SO_4 + \text{fire} = Na_2H_2(SO_4)_2 + 2NH_3$). This bi-sulphate is then heated with common salt, which produces the neutral sulphate and hydrochloric acid. ($Na_2H_2(SO_4)_2 + 2NaCl = 2Na_2SO_4 + 2HCl$), the sulphate is next dissolved in water, mixed with the recovered ammonia, and treated with carbonic acid gas, thus yielding bicarbonate of soda and sulphate of ammonia, the latter ready for use over again in subsequent operations. The sulphuric acid and the ammonia being thus continually recovered, the only materials really used are the common salt and the hydrochloric acid, the former becoming carbonate of soda, while the latter is transformed into bleaching powder by the usual process.

The third, and, perhaps, when all things are considered, the most ingenious of these innovations, is that introduced by Messrs. Parnell & Simpson, and which boldly aims at combining, and bringing the two great rivals together. Its primary object is to provide a substitute for the lime used to recover the ammonia in the Solvay process; and as a secondary but important object, it seeks to recover the sulphur lost in the "tank waste." This twofold purpose is accomplished by using the waste to decompose the residual ammonium chloride. The ammonia combines with the waste to form ammonium sulphide, which passes over in gaseous form from the decomposing apparatus, leaving a residual liquor of calcium chloride. The ammonium sulphide is used instead of simple ammonia to saturate the salt solution. By the addition of pure carbonic acid gas, the sulphide is decomposed, ammonium bicarbonate is formed in the liquor, whence bicarbonate of soda is derived according to the usual reaction with evolution of hydrogen sulphide. This latter gas is conducted into a holder of special construction to be stored, and is burned for the production of sulphur by what the inventors have called "a method of restricted combustion." The gain by this process is said to be equal to a ton of lime saved and six hundred weight of sulphur recovered per ton of carbonate produced, and no voluminous explanations are necessary to show even those who are but slightly conversant with the subject, that the scope of this invention tends to completely change the conditions to which the manufacture of soda is at present subject.

This preliminary and hasty general review has been sufficient to show that neither of the two great rival processes can be regarded as complete in itself, for while the one may fairly lay claim to the monopoly of profitable soda making, the other certainly enjoys the monopoly of bleaching powder.

The Leblanc manufacturers are known to be losing considerably on every ton of alkali they produce, but they have counteracted this loss by a combination amongst themselves which so consolidates their interests that a sufficiently remunerative price is affixed to their by-product, not only to make up for the loss on their soda, of which they have wisely restricted the production to the bare equivalent of the bleaching powder required for consumption, but to allow a certain reasonable profit on the entire output. Whenever there is a fall in soda this all-powerful combination restores the equilibrium by increasing the price of bleaching powder, and nothing can shake or alter this condition until the Solvay process can produce cheap chlorine.

How immensely important are the questions at issue, and how much the interests of both branches of the industry are involved, may best be gathered from studying the following table, compiled by Her Britannic Majesty's Chief Inspector under the "Alkali works regulation act," Mr. A. E. Fletcher:

ANNUAL PRODUCTION OF ALKALI, ETC., IN THE UNITED KINGDOM.

Year.	Salt decomposed.	Alkali, 48 per cent.		Soda crystals.	Caustic soda.	Bleaching powder.*	Bicarbonate of soda.	Total.
		Leblanc process.	Ammonia process.					
1877.....	578,201	217,556	6,220	169,769	74,663	105,529	12,109	1,164,047
1878.....	568,542	196,876	11,116	170,872	84,612	105,044	11,756	1,148,818
1879.....	615,287	230,683	15,526	185,319	86,511	115,290	13,083	1,126,699
1880.....	700,016	266,093	18,800	192,926	106,384	131,606	13,539	1,429,364
1881.....	675,099	238,687	20,400	203,773	108,310	135,826	12,853	1,394,948
1882.....	679,935	233,213	39,000	180,846	116,864	135,170	14,115	1,399,143
1883.....	705,732	227,284	52,750	188,678	119,929	141,868	13,609	1,452,188
1884.....	690,502	204,072	61,480	182,567	141,639	128,651	14,576	1,423,487
1885.....	722,472	184,597	77,530	202,705	144,954	132,761	15,179	1,480,198
1886.....	713,112	165,782	85,000	182,379	153,884	136,234	15,083	1,454,465

*This includes chlorate of potash, taking 5 tons of bleaching powder for 1 ton of chlorate. The amount of chlorate of potash now made is 7000 tons per annum.

To the significance of these figures we may merely add that the ammonia process is used in France and Germany to the extent of nearly 70 per cent of all the soda produced; that it has made great progress in Austria and Russia, and that it has undoubtedly taken the lead and is looked upon with much favor in this country. Whether the Leblanc process is ever to become established among us or not is a question we shall deal with a little later on: meanwhile, we may proceed with our subject by describing in detail the following branches of the industry, on the lines dictated by all the most modern modifications and improvements:

1. Manufacture of salt, salt cake, and hydrochloric acid.
2. Manufacture of soda ash, refined alkali, soda crystals, and caustic and cream soda.
3. The manufacture of chlorine and bleaching powder

TO BE CONTINUED.

GEMS AND PRECIOUS STONES.*

By George F. Kunz.

THE DIAMOND.

The most valuable of precious stones is the diamond—pure crystallized carbon—the most highly refractive and the hardest of gems, and the only one that is combustible. This latter property was discovered in 1691 by Cosmo III, of Tuscany, who ignited the diamond with a burning-glass; and later it was found that when burned in a crucible this gem converts iron into steel. The diamond generally occurs as an octahedron, and surpasses all other gems in the property of dividing light into colored rays, causing that peculiar flash of prismatic hues called its *fire*.

Diamonds are rated by the *carat*. The term carat is derived from the name of certain small leguminous seeds which, when dried, are quite constant in weight. They were used in India for weighing gems.

In 1871, the syndicate of Parisian jewelers, goldsmiths, and gem-dealers, suggested .205 of a gramme as the value of a carat; and this was confirmed in 1877, all the leading diamond-dealers of London, Paris, and Amsterdam accepting it. The English carat is equal to 3·1683+ grains (commonly reckoned as 3.17 grains) troy, hence there are 151½ carats in an English troy ounce. The jewelers' carat is subdivided into halves, quarters, eighths, sixteenths, thirty-seconds, and sixty-fourths. A quarter-carat is called a grain; pearls are always sold by the grain.

The earliest known mention of diamonds is supposed to be that in the Indian epic "Mahâbhârata," B. C. 1000. Before 1728, the date of the discovery of the Brazilian mines, all diamonds were brought from India and Borneo. There are three distinct diamond producing regions in India; the familiar word Golconda is not the name of a mine, as popularly supposed, but merely the general term for the market where diamonds were bought and sold. To-day all the mines are nearly closed.

Indian diamonds occur in a conglomerate, and also in alluvial or superficial deposits, together with pebbles, ferruginous quartz, and jasper. Early methods of mining were very crude. The conglomerate was dug out and carried to small square reservoirs, raised on mounds, where it was carefully washed and sorted, the wet diamonds being readily recognized by their peculiar vitreous luster.

At present India yields very few stones, while Borneo produces only about three thousand carats annually. Diamonds are also mined in New South Wales, and are met with in California, the Ural Mountains, North Carolina, and Georgia. In 1856, the "Dewey Diamond," that cut eleven and a half carats was found near Manchester, Virginia.

SOUTH AFRICAN DIAMOND FIELDS.

By far the greatest portion of the diamonds now obtained come from the mines of South Africa, which were discovered, near Hopetown, in 1867, by some Dutch children. They are situated in Griqualand West, now a part of Cape Colony, in latitude 28° 40′, longitude 25° 10′ east, about 640 miles northeast of Cape Town and 500 miles from the seacoast. Although they are at an elevation of nearly 4000 feet above the sea-level, the heat is excessive during the summer months, when the work is principally carried on. There are four large mines, all within a radius of a mile and a half. The celebrated Kimberley covers seven and a half acres.

The African mines were originally worked in individual claims, 3143 in number, each 31 feet square, with a roadway seven and a half feet wide between each pair of claims. These small claims are now consolidated into about ninety large companies and private firms, having a gross capital of nearly $50,000,000. Thirty-three million carats (over six and a half tons) of diamonds have already been taken out, valued in the rough at £45,000,000, and after cutting at £90,000,000. The absorption of the smaller by the larger companies (*unification*) is constantly going on, and it is proposed to consolidate all the companies into one gigantic monopoly.

Ten thousand natives, each receiving one pound a week, are employed in the mines under the supervision of twelve hundred European overseers.

The enormous sum of over £1,000,000 is annually expended for labor. This mammoth investment of European capital has been profitable to the shareholder, and it would have been still more so were it not for the thievishness of the native diggers, who, instigated by the vicious whites that congregate on the fields, steal and dispose of from one fifth to one fourth of the entire yield. More improved methods of surveillance, recently introduced, notably the compound system, by which the natives are confined in the company's care during the period of contract, have diminished this loss. None but authorized agents are permitted to purchase or possess rough diamonds, and a large detective force is on the alert to prevent any infringement of the rules. The lengths to which the natives and their white accomplices go in their fraudulent traffic may be judged from the fact that chickens have been decoyed to the mines by them and made to swallow diamonds. A *post mortem* recently held on the body of a Caffre who had died suddenly, revealed the fact that death was caused by a sixty carat diamond which the native had swallowed.

THEORY OF FORMATION.

At the Kimberley mines, the diamonds were first obtained on the surface in a yellow earth, the result of the decomposition of strata found 100 feet below, and known as "blue stuff." Scattered through it are angular pieces of carbonaceous shale, garnet, mica, etc. At a depth of 600 feet, a hard rock (peridotite) was found, containing the same shale. This shale has evidently been altered by the action of heat produced by the penetration of the volcanic rock through it; and this heat, causing the liberation of some volatile hydrocarbon, has doubtless produced the diamond. The mines are so surrounded by carbonaceous shale that they form, as it were, "pipes" in the center of it.

In the Kimberley mine a depth of 600 feet has been reached. The number of obstacles which have been successful overcome and the novel machinery in use make the mining at Kimberley the most systematic of the kind in the world. Progress has been rapid. On the site of the

*Written for the second edition Appleton's Physical Geography and thus published in advance by special permission.

desert there is now a city of 25,000 inhabitants, with water-works, railroads to the coast, and many other improvements of modern civilization.

BRAZILIAN MINES.

In Brazil diamonds are found in several localities. At Diamantina, in Minas-Geraes, 4,000 feet above the sea, the stones occur usually in the gravel and sands resulting from disintegrated rock. Up to 1850, over 7,000,000 carats, worth £11,000,000, had been taken from the Minas-Geraes mines alone. Perhaps the entire yield from Brazil may be estimated at 13,000,000 carats, worth £20,000,000.

The beds of rivers have been turned aside to aid in the search for diamonds, but the methods of mining have always been very crude. Little machinery has been used, the work of sorting being performed by slaves, who were rewarded for any exceptional find.

REMARKABLE DIAMONDS.

Some diamonds are celebrated for their size or the interesting legends connected with them. The Regent, or Pitt diamond, weighing 136$\frac{14}{16}$ carats, and originally purchased by Lord Pitt for £1000, is the finest large diamond in the world. It was discovered in India in 1701, and weighed 410 carats in the rough. Valued at 12,000,000 francs, it was one of the few valuable French crown jewels retained by the government at the great sale in May, 1887, which netted 7,220,000 francs.

The finest blue diamond is the "Hope," which is almost sapphire-blue and weighs 44$\frac{1}{4}$ carats. It is an Indian stone and evidently part of Tavernier's blue diamond which was stolen from the Garde Meuble in 1792. It was purchased by Mr. Henry Hope for £18,000. The Dresden Green Vaults contain the finest green diamond, a pear-shaped 48$\frac{1}{2}$ carat brilliant, the "Dresden Green."

Among the largest diamonds is the Orloff in the scepter of the Emperor of Russia, weighing 193 carats. It is fabled once to have formed the eye of an Indian idol, and to have been stolen by a French deserter. In the Russian treasury is also the Shah, 86 carats. Tavernier's Great Table weighed 242$\frac{5}{16}$ carats.

The Tiffany yellow diamond, the largest diamond in America, is a flawless double-cut brilliant. It was found in South Africa, weighs 125$\frac{5}{8}$ carats, is of a rich orange-yellow color, and is the finest yellow diamond in the world. It is valued at $100,000.

The "Great Mogul" was described by Tavernier, the famous traveler, in 1678. He states that its weight was originally 793$\frac{5}{8}$ carats, but in cutting it was reduced to 279$\frac{9}{16}$ through the stupidity of the cutter, who is said to have been fined his entire fortune for his carelessness. This magnificent stone was named after the founder of the so-called Mogul dynasty in India. It has disappeared, though some identify it with the Koh-i-Nûr (Mountain of Light), which weighed, when first brought to England, 186$\frac{1}{16}$ carats, but was reduced by re-cutting, in 1852, to 106$\frac{1}{16}$ carats. The Koh-i-Nûr, "the great diamond of romance," is now among the English crown jewels. Barbot valued it before re-cutting at £140,000.

A diamond, weighing 457$\frac{1}{2}$ carats, was brought from the Cape in 1884; it has been cut into a brilliant weighing 180 carats. The finding of this great stone is enveloped in mystery. The name "Victoria" or "Imperial" was given to it in honor of the Queen, and it is undoubtedly the largest brilliant in the world. It is valued at £200,000.

VALUE OF DIAMONDS.

In diamonds, perfectly white stones or decided tints of red, rose, green, or blue, are most highly prized. Fine cinnamon and salmon or brown, black or yellow stones, are also esteemed. If flawless and without tint of any kind, they are termed "first water." If they possess a steely-blue color, at times almost opalescent, they are called blue-white. Such are usually Brazilian stones. Exceptionally perfect stones are termed gems, and for such there is no fixed value, the price depending on the purity and the brilliancy of the stone.

The term "first water" varies in meaning according to the class of goods carried by the dealer using it. It is impossible to estimate the value of a diamond by its weight—color, brilliancy, cut, and general perfection of the stone, are all to be taken into account. Of two stones, both flawless and weighing ten carats, one may be worth $600, and the other $12,000. Exceptional stones often bring special prices, whereas off-color or imperfect stones sell at from $50 to $75 per carat, regardless of size.

The probable value of all the diamonds in the world is about $1,000,000,000. The world's diamond trade is carried on by about eight thousand dealers, with a total stock of not far from $350,000,000. The stones are prepared for market, by, perhaps, forty-five hundred cutters and polishers, principally in Amsterdam, Antwerp, Paris, and the Jura. A limited amount of cutting is also done in England and the United States.

The ruby and the sapphire are varieties of the species corundum. The yellow variety is known as Oriental topaz, the green as Oriental emerald, and the purple as Oriental ameythst. The two latter forms are rare. The sapphire belongs to the hexagonal system, is next to the diamond in hardness, and is composed of nearly pure alumina.

The most highly valued rubies, which are of the color of pigeon's blood, are found near Mandelay, in Burmah. In Ceylon they occur of a lighter color, and in Siam of a very dark red. Although the diamond is more generally esteemed, the rarity of rubies of from three to four carats' weight is such that they are worth five to ten times as much as diamonds of the same size. The choicest colors of the sapphire are the cornflower and the velvet-blue.

The chrysoberyl gems, next to the sapphire in hardness, include the varieties of yellow, brown, green and an endless number of intermediate shades. The variety of chrysoberyl in which impurities are found between the layers, or the layers are so arranged by twinning that, if the stone is cut across the layers, the light is condensed in an even line, is called chrysoberyl cat's-eye, and it is dark olive green by day, and columbine red by artificial light (alexandrite).

Beryl is a silicate of glucina and alumina. Golden-colored beryl is found in Maine, Pennsylvania and Connecticut. When the beryl is colored with chromium, we have the emerald. The finest emeralds are from the Muso mine, near Bogotá, where they occur in a rock containing bituminous concretions filled with fossils. This mine has been worked for the past three centuries by Europeans, and was previously operated by natives and ancient Peruvians.

Some of the finest crystals of emerald known have been found in Alexander County, North Carolina; one weighing ten ounces, but of small gem value, has been found there. When really fine and flawless, emeralds rank with diamonds in value.

Topaz occurs yellow, blue, cherry, green, and white. Tourmalines are found in Brazil, Siberia, and in remarkable perfection at Paris and Auburn, Me.

Quartz gems are pure silica colored by iron or other oxides. When pellucid the crystalline varieties are called rock-crystal; when colored purple or violet by oxide of manganese, amethyst. The crypto-crystalline varieties of quartz are chalcedony, gray, bluish-gray, or brown, with a waxy luster. When banded with rock-crystal, jasper, etc., it is called agate. When translucent like horn, yellow, yellowish-brown, or red, it is called carnelian. When in bands of white, gray, and other colors, it is called onyx (used for cameos); with moss-like markings produced by oxide of manganese or iron, moss-agate. Moss-agate occurs in immense quantities in parts of the West; agatized wood (in which the wood-fibers are changed to agate by the infiltration of silicious waters) is found in Arizona and the Yellowstone Park.

Noble opal is milky, almost apaque, with a play of brilliant, red, green, orange, and other hues. Hungary, Honduras, and Mexico are the localities for this stone. When yellow, red, and green colors combine like flashes of fire, the name fire-opal is given to it. This species is found mostly in Mexico. California furnishes beautiful opalized wood.

Pearls are small bodies found either in mother-of-pearl shells or in those with a nacreous lining. They are formed either by a disease, by the presence of a parasite, or by an effort on the part of the mollusk to rid itself of some foreign substance which has found its way into the shell.

Pearls are composed of many layers of carbonate of lime with organic matter between, are not always entirely pearly throughout, and invariably have some small central core or nucleus. Round pearls of fine luster and color are very valuable, and their value increases rapidly with their size.

The finest white pearls are from India, the Persian Gulf and Panama; the finest black and gray pearls, from the coast of Lower California. Beautiful pink-tinted pearls are often secreted by the common brook-mussels, the common conch, or strombus gigas. One valued at over $2,000 was found near Paterson, New Jersey, in 1856, and quite a number have been met with in Ohio, Tennessee, Kentucky, and Texas, and also in England, Scotland, and Germany.

The forms in which gems are cut are divided into two groups—those with plane and those with round surfaces. To the first belong the brilliant, step or trap cut, and the table-cut or rose-cut; to the second, the single, the double and the hollow cabochon or carbuncle cut.

The brilliant cut is usually modified, but when perfect fifty-eight facets are required—thirty-three constituting what is called the crown or upper part, the large facet being termed the table, and twenty-five the back, pavilion, or base. The small facet at the bottom is called the collet or culet, and the edge of the stone the girdle. This form of cut is most extensively used for diamonds, but is occasionally employed for other stones.

Emeralds, rubies, sapphires, and other colored stones usually have the step-cut, so called from the fact that the facets on the crown are in a step-like series, and below the girdle are three or more diminishing zones terminating in a culet. The encabochon or carbuncle cut is that in which the top is rounded off and the back flat, hollowed out, or the same as the top. Garnets, turquoises, opals, cat's-eyes, are cut in this manner. In the rose-cut, the back is flat and the top covered with triangular facets, generally from twelve to twenty-four in number.

IMITATION STONES.

Rhine stones, the Lake George, California, Swiss, and Swedish diamonds, with the so-called diamond-coated stones, are all paste or lead glass.

These imitations have been recently improved by the addition of little metal cups or coatings filled with mercury, for which reason they are known as foil-backs, brilliants, etc., but the hardness of all is below that of flint-glass. Paste gems are made of silica and oxide of lead, colored with metallic oxides to produce the required shade of color.

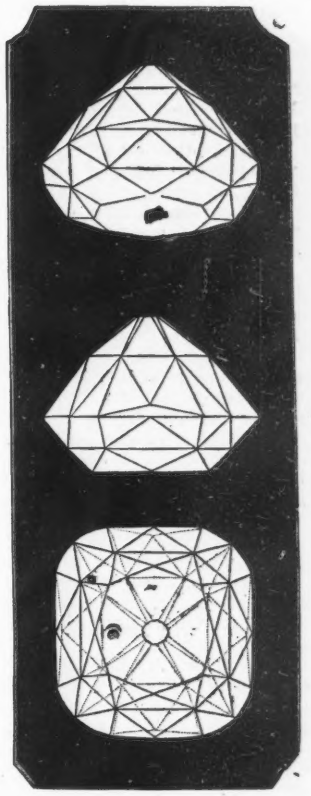
In doublets, the crown is made of quartz, garnet, or some equally cheap and hard stone; but all below this is paste of the desired color, the two parts being joined by cement or fire.

Imitation pearls are small, blown spheres of slightly opalescent glass, roughened and lined with a preparation made from the scales of a small fish found in Switzerland (the bleak), and then filled with wax.

Japanese Industries and their Development.—During the past few years Japanese manufacturing industries have made very considerable progress, and full advantage has been taken of the limited liability principle. Foreign residents in Japan looked upon the movement with some amount of suspicion, thinking it might be wanting in stability. Recent returns, however, have shown that substantial profits have been earned. In a miscellaneous list of thirty-four companies the dividends vary from 4 to 26 per cent for the half year. The Osaka Spinning Company, with a capital of 600,000 yen, distributes 26 per cent to its shareholders; the Tokio Tram Car Company, 21 per cent; and the Osaka Sulphuric Acid Compony 18 per cent. One hundred and sixty-one banks are quoted as paying dividends for the first half of this year varying from 3·2 to 23 per cent, only one bank not paying a dividend at all. Eighty-two paid over 10 per cent; fifteen of these paid 15 per cent and over, and a large number 10 per cent. Of fifteen exchanges quoted, the rates for the half year varied from 3 to 90 per cent, the higher rate being that of the Tokio Stock Exchange. Presuming these dividends to be fairly earned, the returns must be very gratifying to the Japanese, while at the same time they convey a very serious warning to the foreign importer.

DIAMOND MINING.

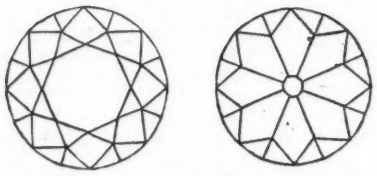
THE VICTORIA DIAMOND, IN THE ROUGH. NATURAL SIZE.



THE TIFFANY DIAMOND. NATURAL SIZE. CROWN, SIDE, AND ANGULAR VIEWS.

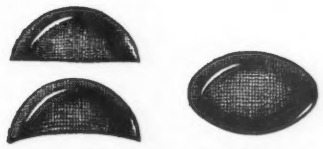
BRILLIANT CUT. ROSE. SIDE VIEW.

(From a photograph.)

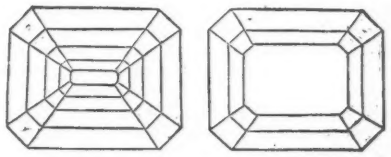


CROWN. PAVILION, OR BASE, SHOWING COLLET.

BRILLIANT CUT.

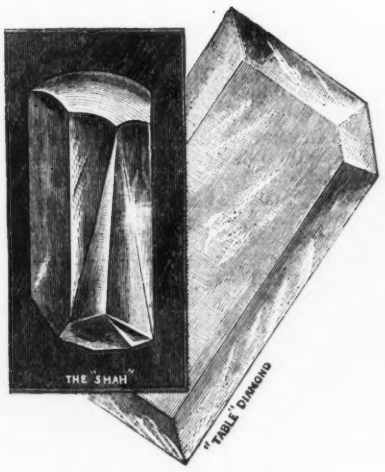


SINGLE, HOLLOW, AND DOUBLE CABOCHON.

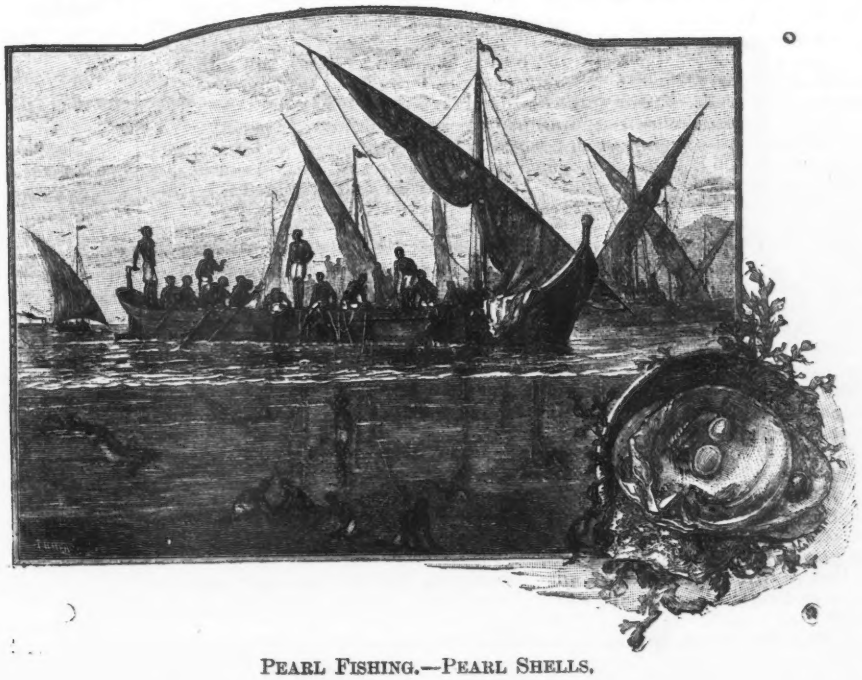


CROWN. BACK, OR PAVILION.

STEP OR TRAP CUT.



TAVERNIER'S TABLE DIAMOND.



PEARL FISHING.—PEARL SHELLS.

A HISTORY OF THE "SLIDING SCALE" SYSTEM OF "PROFIT SHARING" IN THE PENNSYLVNIA COAL MINES.—III.

(*Continued from Page* 293.)

On the 7th of November, 1870, the committees of the A. B. of T. and the W. B. A. agreed to advocate the adoption of the following terms for 1871, provided that satisfactory arrangements could be made with the railroad company for a fair reduction of tolls.

With coal at $2.50 per ton at Port Carbon, outside wages to be $9 per week; inside wages $10 per week; miners $12 per week. Contract work to be reduced sixteen and a half per cent. from the basis of 1870. The reduction or addition of percentage to be graded on the new price thus formed, at the rate of one per cent. for each three cents advance or decline in coal.

On December 1st, 1870, the Northern or Lackawanna companies decided to reduce wages in their districts. This was resisted, and a general suspension ordered by the General Council of the W. B. A., January 10th, 1871.

On January 25th the delegates of the W. B. A. in Schuylkill County resolved to adhere to the $3 basis, if the Northern or Lackawanna companies co-operated with them; if not, they would make the best terms for themselves they could. This entirely repudiated the action of the committees on November 7th, 1870.

The Philadelphia & Reading Railroad Company having determined to increase the rate of tolls as shipments decreased, the authority of the legislature was invoked by the men, and the Judiciary Committee of the Senate was instructed to take testimony and report.

The difficulties culminated in the arbitration of the matters in dispute between the operators and workmen.

Representatives of both sides, representing Carbon, Luzerne, Schuylkill, Columbia, and Northumberland counties, met at Mauch Chunk April 17th. Judge William Elwell, of Bloomsburg, was selected as umpire.

E. W. Clark, on the part of the operators, and James Kealy on the part of the workmen, formally presented their statements in reference to the questions of interference with the works, and discharging men on account of their connections with the W. B. A.

The presentments of each side having been rejected by vote, they were referred to the umpire, who, at the next session, gave the following decision:

CONTROL OF WORKS.

First.—The right or an owner or lessee and operator of a colliery to the entire and exclusive control and management of his works is guaranteed to him by the law of the land, and is of such an unquestionable character that it ought not to be interfered with either directly or indirectly.

Second.—The umpire concurs with and adopts, as a correct statement of the law, that part of the late proclamation of the executive of this Commonwealth, wherein he says, that "It is unlawful for any person, or association of persons, by violence, threats, or other coercive means, to prevent any laborers or miners from working when they please, for whom they please, and at such wages as they please, and alike unlawful, by such violence or threats, to deter or prevent the owners or operators of mines from employing whomsoever they may choose to employ, and at such wages as may be agreed upon between the employer and person employed."

Third.—It is the undoubted right of men to refuse to work except upon such terms as shall be agreeable to them; but a general understanding that no person of a particular association of laborers shall work for any operator who has in his employ a member of such association who has not paid his dues to the association, or a man who does not belong to such association, is contrary to the policy of the law, and subversive of the best interests of the miners and their employers. An association may inflict fines upon its members for breach of its by-laws, and expel for non-payment, but it has no right, by combined action to place the defaulter in the light of an outlaw in the transaction of business with others.

Fourth.—The umpire decides that it is contrary to the spirit of the law, as stated secondly above, for a body of men to agree not to work because their employer refuses to employ a particular person, or because he has discharged such person. If such a case arises where the act of the operator is deemed to be oppressive and he refuses to redress the wrong, it is a proper one for local arbitration, by which, in most cases, the difficulty could be properly settled without the disastrous consequences arising both to the employers and employed by a strike, even at one colliery.

Fifth.—As persons of sound mind and competent age are permitted by law to bargain for themselves, their contracts in regard to labor at the mines should be held as sacred as other contracts, and should not be annulled or set aside in any manner different from that provided for other cases. Interference by persons not parties to the contract is not to be tolerated.

Sixth.—Operators ought not in any manner to combine against persons who belong to the Miners and Laborers' Benevolent Association. Any operator who refuses to employ a person because he is so connected, or who shall discharge him for that reason, would thereby give good grounds for censure, and for other members refusing to work for him.

Seventh.—No member of the Miners and Laborers' Benevolent Association ought to be deprived of work because of his being selected by his branch to perform the duties mentioned in Sec. 3, Article 16 of the by-laws of that association, if his duties are performed in the manner therein mentioned.

Eighth.—In regard to the right claimed by the miners to cease work when they see cause, whether in body or otherwise, it is impossible to lay down any rule, and I am not aware that it is expected of me to do so, but I may be allowed to recommend that, after resumption takes place, and business is again moving in its accustomed channel, that immediate steps be taken to provide for the adjustment of difficulties, if any shall arise in future, before they reach the disastrous proportions of those which now afflict, not only the laborers and operators, but the whole country.

Ninth.—Whenever it is stated in the foregoing report that an act is unlawful, is censurable, or ought not to be; it is to be understood in the same manner as if the umpire had awarded that such act shall not be done nor allowed by either of the parties represented in this arbitration.

MAUCH CHUNK, April 19, 1871. WM. ELWELL, *Umpire.*

The manner in which the question of wages for Schuylkill County should be presented to the umpire was agreed upon as follows:

Articles of Agreement made and entered into between the Anthracite Board of Trade and the Miners' and Laborers' Benevolent Association, this eleventh day of May, 1871.

We agree to submit, for the decision of the umpire, Judge Elwell, the question of wages for Schuylkill County for the year 1871, as follows:

First.—The operators' proposition as made at Philadelphia, namely: Basis to be $2.50 at Port Carbon, with outside wages at $9 per week; inside wages at $10 per week; miners $12 per week; contract work to be reduced sixteen and a half per cent from the present rates. The advance or decline of wages to be one per cent for every three cents advance or decline in the price of coal, to be graded on the new prices thus formed. Wages not to be less than would be paid with coal at $2 at Port Carbon.

Second.—The Miners and Laborers' Benevolent Association's proposition of $3 at Port Carbon, as a minimum, with wages as last year at that rate, namely: Outside wages $11 per week, inside wages $12 per week, miners $14 per week, advance to be one per cent. for every three cents advance in the price of coal.

We agree to the reference of the above propositions under the following conditions and terms:

First.—Each side to submit their proposition, with argument thereon, in writing, to the umpire.

Second.—Men to resume work at all the collieries immediately. The wages to be paid to be in accordance with the decision of the umpire.

Third.—Prices shall be obtained from a list of all operators shipping over 20,000 tons in 1870. Five operators shall be chosen from this list, by lot, on the 10th day of each month (if Sunday, then the preceding day), by four persons, two to be chosen by the Anthracite Board of Trade and two by the Miners and Laborers' Benevolent Association. The operators so chosen shall forward to each side of the committee chosen as above, on or before the 15th of the month (or if Sunday, then the preceding day), and announce by circular, the average obtained from the statements so presented, and the wages for the current month shall be based upon the average so obtained. For the month of May, the operators to furnish prices shall be chosen on the 20th inst., and the prices shall be furnished and announced on the 25th inst.

Fourth.—Provision is hereby made for future arbitration in the following manner.

I. All questions of disagreement in any district, excepting wages, which can not be settled by the parties directly interested, shall be referred to a district board of arbitration, to consist of three members on each side, with power, in case of disagreement, to select an umpire, whose decision shall be final. No colliery or district to stop work pending such arbitration.

II. If any question arises involving the whole country, a board of arbitration shall be chosen consisting of five members on each side, with the same rights and duties as for district boards.

Signed on behalf of the parties hereto.

CHAS. M. HILL, *Secretary pro. tem. A. B. of Trade.*

WM. KENDRICK, *President A. B. of Trade.*

GEORGE CORBETT, *Secretary Schuylkill Co. Ex. Board M. & L. B. Ass'n.*

JOHN W. MORGAN, *President pro. tem. Schuylkill Co. Ex. Board M. & L. B. Ass'n.*

JOHN P. FRANCIS, THOMAS LEONARD, MICHAEL LAWLER. } Committee.

The following was the decision of the umpire:

The umpire mutually chosen by the Anthracite Board of Trade of the one part, and the Miners and Laborers' Benevolent Association of the other part, to decide the question of wages now at issue before them, having received and fully considered the written propositions and arguments of the parties, has decided and established the basis and rates of wages below mentioned, as, in his judgment, just, both to the operators and the men in their employ, viz:

Basis, $2.75 at Port Carbon.

Miners, $13 per week.

Inside laborers, $11 per week.

Outside laborers, $10 per week.

Contract work to be reduced 10 per cent upon the prices paid under the $3 basis of 1869.

Wages to advance 1 cent for every 3 cents advanced on the price of coal at Port Carbon above $2.75 per ton, and to decline at the same rate when coal is below that price down to $2.25 per ton.

POTTSVILLE, May 17, 1871. WM. ELWELL, Umpire.

These terms remained in force until September, when a demand was made by the *loaders* of the Thomas Coal Company for an advance of wages to equal the basis rates for the year. This concession being made by that company, and similar terms promised to the othermen working at their colliery, the same demands were soon made at adjoining colleries. Appeals to the officers of the W. B. A. to denounce and stop this flagrant breach of faith produced no effect, and the operators were compelled to promise that there should be no further reduction during the year, as the only alternative to their being compelled to stop work.

In accordance with the foregoing, the wages were as follows:

1871.	Average price of coal at Port Carbon.	Scale of Wages.	Wages paid per week.		
			Miners.	Inside labor.	Outside labor.
May	$2 93	6 per cent advance.	$13.78	$11.66	$10.60
June	2.61⅛	4 " reduction.	12.48	10.56	9.60
July	2.54 6-10	7 " "	12 09	10.23	9.30
August	2 57 8-10	6 " "	12.22	10.34	9 40
September	2.52 4-10	7 " "	12.09	10.23	9.30
October	2.72 8-10	Basis }	13.00	11.00	10.00
November	2.62½	" } New agreement	13.00	11.00	10.00
December	2.31 1-10	" }	13 00	11.00	10.00
Averages	2.60⅞		12.70¾	10.75¼	9.77¾

(TO BE CONTINUED.)

IRON ORES AND COKING COAL SIDE BY SIDE.

Written for the Engineering and Mining Journal by John M. Bailey.

The wealth of States, like that of cities, depends so completely upon the natural riches of the adjacent country, that no description of the mineral resources of Eastern Kentucky—and especially of its coal beds—could be complete unless due cognizance be taken of the immense deposits of iron ores by which it is bounded on the south and east.

These deposits are merely separated from Kentucky by the Cumberland and Pine Mountains, and there are few regions more deserving of attention than that part of Southwestern Virginia now being opened up by the building of the South Atlantic & Ohio Railroad, which starts from Bristol-Goodson, on the line between the States of Virginia and Tennessee. In this town, whose population exceeds 8000, the unique spectacle is presented of a thriving town one half of which is in the State of Tennessee, while the other half is in Virginia, the centre of Main street being the State line. That part of the town which is in Tennessee is called Bristol; the other half of the town is in Virginia, and is called Goodson. There is but one post-office, and that is in Bristol. The reason of its location is that Tennessee was reconstructed before Virginia, and a post-office was located in this town on the Tennessee side.

Bristol is but 408 miles from Norfolk, 320 to Wilmington, North Carolina, and but 347 miles from Charleston, South Carolina. There is a vast country extending 75 miles east and west and to the north 100 miles which is as little known to the people of the Northern States as almost any country of South America. There is an equally large area lying directly south of the State line of Virginia as little known and possessing as wonderful features as the tract lying north of the line which divides Virginia from Tennessee. This vast tract of undeveloped country extends from Cumberland Gap, on the west, to the West Virginia line on the north, to New River on the east. On the south it embraces a large portion of East Tennessee, North Carolina as far south as Asheville, and Northeastern Georgia, thence north to Cumberland Gap.

The circumference of this vast region exceeds 800 miles. Its area is greater than the States of Massachusetts, Rhode Island and Connecticut, or of New Jersey, Delaware and Maryland. It is not a new country in one sense, for it has been settled for over one hundred years, and contains a population of nearly five hundred thousand persons, but it is entirely undeveloped. There is but one line of railroad within its borders, viz., the Norfolk & Western from its eastern boundary to Bristol, and the East Tennessee, Virginia & Georgia from Bristol to Knoxville, just beyond its western boundary. Thousands of its grown men and women have never seen a railroad or heard the whistle of a steam-engine. A large portion of the people are still clothed in homespun clothes made by carding the wool with hand-cards, spinning it upon hand spinning-wheels, and weaving it on homemade hand-looms.

The climate is unexcelled, the soil is rich and the lands productive. The timber lands are of the best, and the mineral wealth is inexhaustible. The water powers for manufacturing are unsurpassed, and lead, silver, and gold are found in many localities. The richest ores of iron are widely distributed. For more than thirty miles on either side of the South Atlantic & Ohio Railroad lie beds of brown and red hematite ores ranging from three to nineteen feet in thickness. It is estimated that these ores, from their favorable location and proximity to the railroad, can be mined and loaded upon cars for forty cents per gross ton. The coal area of this region is not so extensive as that of Kentucky, but there are still vast beds of excellent coking, gas, cannel and domestic coals.

Nineteen-twentieths of the whole region is elevated from 1600 to 3000 feet above the ocean It is free from malaria and every miasmatic disease, and favorable even in midwinter to lung affections. No section of the United States is better timbered than this. The white pine and the hemlock forests, rival those of Maine and Michigan, while the hard woods are inexhaustible, consisting of black walnut, cherry, white oak, ash, and yellow poplar (white wood), which often attain a circumference of from fifteen to thirty feet, and are from forty to seventy-five feet to the first limb. Here can be seen black walnut trees over twenty feet in circumference, cherry trees over twelve feet, white oak sixteen feet, and yellow poplars by the thousand that would range from ten to eighteen feet in circumference.

COAL.

The building of the South Atlantic & Ohio Railroad from Bristol to the Breaks of the Cumberland Mountains, 130 miles north from Bristol, thence to a connection with the Eastern Kentucky Railroad, whose northern termini are Ashland and Riverton, upon the Ohio River, opens up this country to emigration and development. Connection is also made with the railroad systems of the Northwest, North and Northeast. Mr. Nathaniel Thayer, of Boston, is President of the South Atlantic & Ohio, and of the Eastern Kentucky railroad companies, and he is associated in these enterprises with a large number of the strongest financial men of New York, Philadelphia, Boston, and Louisville.

The completion of the South Atlantic & Ohio Railroad, its consolidation with the Eastern Kentucky Railroad, and the building of the Bristol & South Atlantic Railroad, from Bristol to Asheville, N. C., distant 80 miles, will open to the markets more original growth of valuable timber than is accessible on the lines of all the railroads east of the Mississippi River. Every variety of coal is found in inexhaustible quantities; semi-bituminous, which yields a coke containing over 96 per cent of fixed carbon, less than 3 per cent of ash, and less than ½ of 1 per cent of sulphur; splint coal, equal to anthracite for domestic purposes, lies in beds varying from 5 to 15 feet in thickness. These beds are all above water level, and lie almost horizontally, having just dip enough to afford natural drainage. Prof. A. S. McCreath, Chemist to the Geological Survey of Pennsylvania, says: "These coals are sufficiently pure to be used raw in the furnace; the coke made from them is the nearest approach to pure charcoal found in the known world."

IRON ORES.

Contiguous to these enormous coal deposits, covering over 150,000 acres, are equally extensive supplies of red and brown hematite iron ores, rich in metallic iron, with a remarkably low percentage of phosphorus, and extending southward from Bristol for seventy-five miles. About twenty-five miles from Bristol is the magnetic iron ore country; hundreds of square miles of magnetic iron ore containing from 50 to 70 per cent metallic iron and free from phosphorus—enough to furnish the world with steel for ages.

During 1886, between two and three million tons of ore suitable for Bessemer steel were shipped from the Lake Superior mines to Pittsburg, Bethlehem, Youngstown and other steel producing places. The average distance it is transported to reach coal to manufacture it into steel exceeds 800 miles. When it is known that a ton of Bessemer steel can be made at Bristol from Cranberry ores, and coal from the mines of Scott and Wise counties, at a cost of less than it takes to pay the freight on the materials required to make a ton of Bessemer steel in Pennsylvania, there will be a revolution in the iron and steel industries. The magnetic ores yield an iron equal to the best Swede. Copper ore is found, and with adequate means of transportation will yield richly in copper, and produce sulphur enough to render any importation from Sicily unnecessary.

Although the ENGINEERING AND MINING JOURNAL is chiefly devoted to the development of our mineral sources, it need not hesitate to devote a few words to

AGRICULTURAL POSSIBILITIES,

for it can not overlook the important relation which a rich and fertile soil bears toward those industries which come more strictly within its province. The soil of this entire section is extremely fertile, even upon the steepest hill and mountain sides, and is capable of sustaining a dense population. Thus all those engaged in mining and manufacturing are sure of an abundance of those necessities which will not bear long transportation. An intelligent and prosperous agricultural population in a mining and manufacturing region is as valuable an adjunct, in an economical and moral point of view, as are the mining and mechanical industries, to the material prosperity of the agriculturists themselves. Strikes and other labor troubles seldom assume formidable proportions where Ceres and Pomona walk hand in hand with Vulcan. Corn, wheat, and all the grains yield abundant harvests, while vegetables and fruits attain their highest excellence. It is emphatically the home of the grasses, every species growing finely. The grape is thrifty and the mountain sides of the entire region could be clothed with every variety of the vine that is cultivated on the slopes of the Alps in France and Switzerland.

Horses, horned cattle and sheep are often raised without ever being fed, finding abundant and nutritious pasturage on the evergreen or winter grasses which grow along the sides of the mountains. Nature has done here her grandest work, and the scenery is sublime beyond description. Mountains seem piled upon mountains, some of them the tallest east of the Rockies, while they are of greater proportions than the White Mountains of New Hampshire, the Adirondacks of New York, or the Alleghenies of Pennsylvania. Nowhere do they fail to be beautiful, clothed as they are with emerald carpets of luxuriant blue-grass to their very summits, or covered with dense forests of immense trees. Thousands of fertile valleys lie between the greater and lesser mountains, which, viewed from one of the loftiest peaks, rise before the vision as far as the eye can reach, like waves upon the boundless sea.

In a word, all is grand, healthy, and mountainous – a section in which Nature has done everything, art but little. The woods, the vales, the running streams, stand in their primitive and lovely grandeur and invite the hand of skill and taste. In these secluded vales, beneath the shadows of the highest mountains, are homes for the settler who desires to find spots similar to the haunts of his childhood, where he may fruitfully expend the labor of his manhood, and pass his after years in peace and prosperity. Here, too, are opportunities for the profitable employment of brains, energy, enterprise, and capital in developing these unequaled mineral, forestal, and agricultural resources.

THE ECONOMY OF IMPROVED COKE-OVENS.

Written for the Engineering and Mining Journal by F. Koerner, Mining Engineer.

In this country the bee-hive process is practically the only one in use. From the mass which has been written upon the process and from the experiments made by recognized experts, a few facts stand out prominently:

1. The process is very wasteful. In order to arrive at the loss, A. L. Stevenson, of England (see *Journal of British Iron and Steel Institute*, page 406, 1877), accurately weighed 230 tons of coal which contained by analysis 206 tons of fixed carbon and ash, and should have given, if the claims of the adherents of bee-hive coking have any value, a quantity of coke approaching these figures, viz., 206 tons; instead of that, he obtained 138 tons; the loss, therefore, was 31 per cent! This experiment is of special value, because it was made by an adherent of bee-hive coking, who is a recognized authority: because it was made in the regular course of business; and because Mr. Stevenson's bee-hive ovens were of an improved kind—at least an attempt was made to partially utilize the gases of the coal.

2. We waste nearly all the gases of the coal. When it is beyond cavil that coals with 10 per cent volatile matter are successfully coked by using this volatile matter for coking them, then any excess of gas, beyond the quantity mentioned, which is lost in bee-hive coking, can readily be used as fuel for boilers, for roasting ore, for burning lime, for heating puddling and other furnaces. These gases also contain valuable ingredients, such as tar and ammonia, which may be abstracted from them without interfering with the process of coking wherever and whenever they can be sold with a profit.

3. In bee-hive coking we waste at least one half the labor. The Germans who invented the bee-hive oven about one hundred years ago (see Ure's Dictionary), and the people of Connellsville and elsewhere make coke by the same venerable system of hand labor. In all other metallurgical processes we have applied labor saving appliances; in coke making almost alone we have been and are unflinching adherents of *old* systems of European hand labor. In the anthracite country it cost us to handle, clean, and prepare for market a ton of coal, other than mining, from 18 to 35 cents in 1856; a generation of *progressive* men reduced this cost to 3½ to 7 cents in 1886. It can be said fearlessly that this result has been

infinitely more difficult of attainment than it would be to reduce the cost of labor in coking one half.

4. Our way of injecting cold water into the oven to cool the coke delays the process and causes extra repairs.

5. The face-length of one hundred bee-hive ovens being about 1400 feet, an equal length of cooling floor, of retaining wall, of tramway and railway tracks, of excavation, become a necessity.

6. The losses caused by waste of fixed carbon and labor in our present bee-hive process exceed $20,000 per annum on a plant of 100 ovens; and one of the most successful American iron masters calculates that on an average $1 per ton on pig-iron may be saved by adopting a rational system of coking, and prior thorough preparation of the coal.

But it may be asked: "Why have we, the people *par excellence* who invent and adopt improvements of all sorts, adhered to fossil ways in coke making?"

The reply will be easy enough when we look at the matter as a whole.

1. Periodically when new coke-ovens became necessary, we have been in great haste for immediate results; we took what was well known and quickly built: the old bee-hive oven.

2. The knowledge of more rational and economical processes is to this day almost confined to experts on the continent of Europe, and the literature on the subject is scattered through papers, pamphlets and periodicals in France and Germany.

3. With all our loss and waste there is perhaps no other legitimate business in which so much money has been made as in coke making; under these circumstances, when interested ignorance and indisposition to look into something new and troublesome makes use of the old saw, "Let well enough alone," it has a profoundly wise, prudent and conservative sound. Then there are certain coals in our country for which that of Connellsville, that of the Siwannee seam of Tennessee, and that of the Pratt seam of Alabama may stand as types, which give a good coke in the bee-hive oven; indeed, it has been said that poor coke *can not* be made out of such coals by any means whatever. The owners of such bonanzas are to a certain extent excusable when they refuse to discard the bee-hive; being successful, they have become authorities, and their example is of influence; it is entirely forgotten that *the accident* of their position is of no value whatever as a proof either for their own case or that of others.

4. One of the most potent factors working against the introduction of better processes has been the notion prevalent in England that good coke can be made in the bee-hive alone. When these persons are asked for reasons for the faith they proclaim "they think so"—that's all; sometimes they refer to this or that experiment; when these experiments are thoroughly examined they either prove nothing at all or they prove the very contrary. Just in proportion as these notions are baseless, they are held with characteristic tenacity. The proceedings of the British Iron and Steel Institute illustrate this point very fully. All this would have mattered little to us, had not persons of similar mental calibre, and with only a very superficial and merely local knowledge of the subject, and without all technical training, parrot-like repeated and spread abroad these notions in our own country.

5. When we tried better ovens, in a few instances, it was done by persons mostly who were ignorant of the fact that coking is really a delicate process; that these ovens were originally designed for very different coal than that to which they were applied; that width and depth of the retorts are very important factors; that ovens with gas flues adjusted to coal with 10 or 12 per cent of gases must necessarily fail when the attempt is made to use them for coal rich in volatile matter.

6. Generally when the officers of a coke company are approached about improvements, the applicant is referred to the persons immediately in charge of that department. His first business, naturally, is to show these persons that there is something for them to learn. No matter what tact and delicacy is used, their *amour propre* is offended, they condemn innovations which put them into the position of learners, or they fear a new thing for the possible increased trouble it may cause them. The writer is aware of quite a number of such cases.

Dr. Angus Smith, a very high English authority on coke, calls the bee-hive process "roughness and savagery engendered by wastefulness." Truly, the Doctor is right; the bee-hive is a fossil of the time which has passed away in all other metallurgical processes, especially in our own country.

By the light of the best recent observations in blast-furnace practice we know that furnaces work best when the zone of greatest heat does not reach beyond seven feet above the tuyeres; that coke with the proper physical structure is perhaps the most potent factor in the case. It would, therefore, be a boon to possess the means of making such coke out of nearly all coals with regularity and certainty.

Prior to the utilization of the tar and ammonia in the gases escaping from the coal in coking it was unknown that these gases, in any slow coking process, left a portion of their carbon in a graphitic condition in the coke; when these gases were removed *rapidly* it was found that this trouble did not exist, and that the coke had greater heating power. To reach the same end it is not necessary to make these by-products in coking.

For our circumstances, and especially for our labor, the most, if not all, the late improved coke-ovens with narrow gas flues are not suitable. Trained labor needed for their attendance is not to be had or retained for any length of time.

It has been assumed that the main, if not the only, requirement for the combustion of gases was a sufficient quantity of air. To effect this many devices have been resorted to; patents in great number have been taken out and many books written on the subject; that much good has been effected is undeniable—but the improvement effected has been entirely out of proportion to the thought, labor, and money expended. We have missed a collateral condition of the most effective combustion of gases: *Free development of the flame.* That is motion; flame is motion, pure and simple; whatever hinders free development of the flame interferes with the development of heat.

These hindrances do not act alone by *cooling* the flame, for a body hotter than the flame held into it has the same effect, soot is deposited and the heat lessened. The ordinary retort coke-oven presents in its many small and tortuous flues, so many hindrances to free action of flame, soot is deposited and the process delayed. The writer recognized the importance of the principle involved a number of years ago, but other duties and want of encouragement prevented him from applying it to coking. Since that time some coke-ovens were constructed in which the principle was applied and sufficiently tested to prove beyond any cavil:

1. That coal can be coked with a loss of fixed carbon not exceeding one per cent.

2. That one half the labor may be saved over the bee-hive without the use of so-called rams.

3. That the physical structure of the coke, making it very porous, or very dense and very strong, is simply dependent on the proportions of the retort, and on the mechanical condition of the coal when charged.

4. That most coal can be coked in fourteen to eighteen hours, and without having any graphitic carbon.

5. That a battery of one hundred of such ovens need not exceed six hundred feet in length, and that an important saving may be made in tracks, wall, excavation, etc., and that supervision will be more effective.

6. That this oven can not be choked by soot by any possible carelessness.

7. That the oven is so very simple in construction that ordinary labor can be depended on to build and manage it.

8. That the cost of ovens—per ton of coke—is no greater than the bee-hive.

9. That it is very easy and does not complicate the structure of the oven to lead off the surplus of the gases and use it for other purposes.

The writer submits this matter to the attention of American coke and iron masters with all the greater confidence because it has reached a stage far beyond that of experiment.

WILKES-BARRE, Pa., Oct. 28, 1887.

THE FUTURE OF KENTUCKY.

Written for the Engineering and Mining Journal by Young E. Allison.

When "Pig-Iron" Kelley, of Pennsylvania, was in Kentucky a few week ago, he went to Frankfort, the State capitol, and spent one day in the cabinet of the Geological Survey, looking at the almost marvelous collection of minerals, clays, timbers and coals. After the inspection was over he said: "Kentucky is beginning its progress and is talked about in the East. Now, I want to make a prediction, just to show that I am a good prophet. During the next decade there will be a greater influx of capital and people to Kentucky than there has been to any State in the Union in any decade, save to California immediately after the discovery of gold. I say that, because there is no State in the Union which has such varied and extensive natural wealth as Kentucky possesses, wealth of the very kind that capital is now eagerly seeking out for investment."

Judge Kelley's prophecy was based upon an active principle already at work. During the past year the awakening in Kentucky has been wonderful, and there is no part of the United States where property has been more actively developing or where material progress has been so enterprisingly pushing its way to great results.

Since 1882 the growth of Louisville, the metropolis of the State, has been quite as wonderful as that of any of the Western and Northwestern towns that have been rapidly filled up by foreign immigrants. In 1880 Louisville had 123,000 population. At present there are 195,000 people in the city limits. In 1880 there were 21,000 hands employed in manufactories, where this year a Board of Trade census reports 39,189. In these seven years the street railway mileage and equipment has been almost doubled, and there are to-day 124 miles of such railway running over 144 miles of paved streets. It is a very fine city, its residences looking like palaces, and its streets crowded with the rush of business.

In 1876, when the Clearing-House Association was organized, the clearings aggregated $107,000,000 in twelve months. Ten years later they were $233,000,000, and the weekly reports for 1887 have not failed in any week to show an increase of not less than 16 per cent, occasionally reaching 32 per cent. The clearings for 1887 will reach $290,000,000. The present year's increase comes from the rapid and irresistible growth of business due to a greatly enlarged population and the increase of manufacturing industries. A census made of these for the first six months of the year showed that during that period forty-two new establishments had been opened, bringing in about 3500 workmen. Among these were several very important enterprises, engaged in iron and wood manufacturing, which were forced to remove expensive plants in order to be able to compete for the market.

It is now being generally recognized that for the manufacture of articles into which wood enters Louisville is far and away the most advantageous location in the country, owing to the existence in the State of an almost limitless area of virgin forest, comprising all varieties of oak, hickory, walnut, poplar, and ash. There are 10,000 square miles of this forest in one tract in southeastern Kentucky which will be reached for the first time by rail within the next sixty days. Iron is to be obtained as cheaply here as at Pittsburg, and coal is cheaper here than anywhere in the United States.

During the past seven years there have been four new through lines of railroad completed into Louisville. One is to Chicago and the North, one to St. Louis and the West, a third to Knoxville and the South, and the fourth, Huntington's Chesapeake & Ohio line, to the East. At present contracts are let for five others, two of which are more than half completed and will be in operation before June next. During 1887 seven hundred miles of railway were building in Kentucky, most of which led to Louisville and tend to develop its trade and industries. Nearly $10,000,000 is being expended upon new railroads originating in Louisville, where there are now some sixteen lines, giving connection, within a radius of 300 miles, with over twelve millions of population.

The development of the State is pressed by a greater public emergency than that which sent such an army of population to California in the decade succeeding '49. Gold is a great magnet, but it only represents iron, coal and wood. The pressure behind the movement in Kentucky is the knowledge that, from the borderland of the Blue Grass region in Kentucky over to the North Carolina deposits of magnetic iron ore, there is no other region in any known part of the earth where there are so many avenues to enormous wealth. The millionaires of the Middle and New England States and of Great Britain are not building railroads across

those rugged mountains simply in the enthusiasm of adventurous enterprise. When these roads have effected their common junction in the centre of this territory they will have opened to the world enormous riches, that will employ millions of people. The coal area of Southeastern Kentucky is 10,000 square miles. These 10,000 square miles are covered with a great virgin forest, drained by five rivers and capable of producing great fruit and agricultural supplies.

The time is now close at hand when the United States will have completed the improvements of the Kentucky River, and formed at the head of navigation a pool in which will gather the coal product of innumerable mines. The Kentucky will then succeed the Monongahela as the important stream to all the western and southern coal markets. At Beattyville, in Lee County, which is some 300 miles from Louisville, by way of the river, is the border of the coal bed. Near by are great deposits of cannel coal, which can be mined and marketed at $5 per ton when the Kentucky River is redeemed. This pool would be about equally distant from Cincinnati and Louisville, and the coal could be shipped to the markets west and south of Cincinnati at considerably less cost than Pittsburg coal. The Winchester & Beattyville Railroad, which is now under construction, will be completed by next September, and thus give rail outlet at once to the coal: but it remains for the Federal Government to give to the great consuming population of the West and South the benefit of a national highway to these riches.

The increase of the coal output in Kentucky since 1880 is another of the wonders of development attracting attention. In 1880 the output for the entire State was 23,657,200 bushels (946,288 net tons). During the fiscal year 1886, ending July 1st, 1887, the output, according to the report of the Inspector of Mines (who has under his supervision only those employing more than five persons) was as follows :

Districts.	Mines.	Net tons.	Bushels.
Northeastern	8	245,122	6,128,059
Southeastern	22	633,828	15,845,100
Western	41	914,277	22,856,929
Total	71	1,793,227	44,830,088

Thus the output in seven years has doubled. Each operator has been requested by the inspector to state his probable output from July 1st, 1887, to January 1st, 1888, and the returns upon this request justify the following estimate of the output for the calendar year 1887 :

Distrıct.	Mines.	Net tons.	Bushels.
Northeastern	8	255,161	6,379,029
Southeastern	25	663,599	16,589,569
Western	42	1,010,569	25,264,223
Total	75	1,929,329	48,233,221

July 1st, 1887, there were 4903 persons, engaged in 86 mines, coming under the supervision of the inspector. Counting all mines, large and small, there are not less than 6500 miners employed in Kentucky. While the output is much smaller, and the number of mines greatly less than several other States, it is the fact that so abundant is the coal and so easily is it mined that Louisville has come to be the cheapest market of the United States for coal. The superintendent of a paper mill employing large capital and contemplating improvements investigated the cost of water-power in eleven New England towns. The average cost there per horse-power per year from water-power was $48, while the same power from steam in Louisville was less than $30.

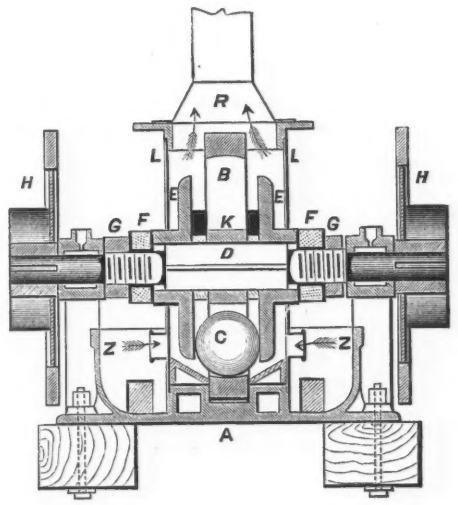
The movement in Kentucky during the current year has been phenomenal. At Pineville, the lower entrance to the Cumberland Valley, land has advanced from 50 cents to $10 per acre. Lumber mills are being erected at that point and all along the Cumberland River prepared to cut timber for the market. The discovery of rich deposits of iron, coal, building stone, etc., is attracting wide attention, and when the railroad is opened to that point next month it will see enterprise, like an army with banners, move into the valley. The Cumberland Valley is almost as beautiful as the Yosemite, and the railroad will open it to the tourist as well as to the capitalist and workman. This is the home of the mountaineer of Kentucky, so unjustly celebrated for his propensity to kill. There is killing in the mountains just as there is in the cities, and by the same class of people. The feuds which spring up between desperadoes offer such picturesque opportunities to the newspaper correspondent that he can not resist the temptation to write romances. As a matter of fact, however, life and property are both safer in the mountains than in the average city anywhere. The people are poor and live in squalid log cottages, but they are free from that vice of great cities—theft. You might hang your purse on the front fence with your saddle at night and it would be entirely safe. The people are polite, hospitable and honest. The murders are committed by the criminal classes and life is just as safe to a peaceful man there as it is in New York City.

Cumberland River winds through a narrow valley, the inclosing mountains being made of numerous strata of coal. In one of these there were discovered 22 veins of coal, 14 of which were workable. Beginning on Pine Mountain, on the north, is the great forest which is penetrated only by bridle-paths and underlaid with coal. South of this begin the great iron fields of Virginia, Tennessee and North Carolina. In this section is where will be seen during the decade an extraordinary development of wealth and opportunities. Within five years railroad lines will have penetrated all the fastnesses, and the Kentucky River will be made navigable to its source. In that time great fortunes will be accumulated, and a new era will have opened in the manufacture of iron and steel.

The Driven Well Patent.—After years of litigation, the United States Supreme Court at Washington has decided that what is known as the Driven Well Patent is invalid. The court thus in a measure reverses its own decisions, for in many former cases brought before it the validity of this patent has always been sustained. The present decision is based on the record in Case No. 16—Nelson W. Green and others against George Hovey—called up on appeal from the United States Circuit Court for the Southern District of Iowa, which sets forth the fact that the invention claimed by Green was in practical use at Cortland, N. Y., more than two years before application for patent was made by him. The patent would have expired by limitation within a year or two. In our issues of May 28th and September 10th we gave information relating to it.

THE PLANET PULVERIZING MILL.

This new patent pulverizer is constructed for the reduction either by the wet or the dry process of emery, mineral ores, quartz, phosphates, cement and similar substances, and is said to perform its work with but a small expenditure of power, friction and wear. As will be seen from the illustration, it is extremely simple in design, and consists essentially of an inclosed body *L L*, through which a shaft *D* passes, said shaft being driven by means of power applied to the fly-wheel pulleys *H H*. On this shaft is a pair of disks *E E*, which revolve with it; these disks are set in towards each other by means of nuts *G G*, acting on the rubber springs *F F*, which cause the disks to hold the ball *C*, weighing some 80 pounds, by gently pressing it on two sides. As the disks revolve, they hurl the ball around the circular ball track *B*, having a diameter of some 30 inches. Material to be pulverized is fed through the hopper *P*. The ball in its revolution bears against and rolls on the track and over what material may be on the track, thereby crushing and pulverizing it. The material, pulverized to the proper fineness, is drawn off through the exhaust outlet *R*, by means of the exhaust fan *U*, and deposited to a large extent in the dust bin *T*, of which there may be a series communicating with each other. The pipe leading from the mill to the first dust bin is telescoped, and may be raised or lowered so as to regulate the size of the work drawn off, raising it gives finer work, lowering it gives coarser work. The finest of the pulverized material, which does not settle in the bins *T*, is carried through the exhaust fan, and by the pipe *N* into the last bin or float chamber *W*. The sides of the latter are to a large extent covered with strong, closely woven muslin, which will let out some of the air, but none of the pulverized material. From this bin a hose of similar muslin leads into the mill through the opening *Z*, thus establishing a complete circulation. The pulverized material is drawn from the bins by the valve *X*.



The mill is run at about 500 revolutions per minute; the disks merely serve to grasp and hurl the ball around. The effective force of the latter results from its weight and velocity. The ball is free to change its axis, hence it wears equally on all parts, and thereby keeps perfectly spherical until worn too small to use.

In order to use the mill as a wet pulverizer, the exhaust arrangement is dispensed with, and in place of it screens of proper mesh are put on the sides of the body, and water run into the mill, which washes the pulverized material through the screens.

While it is impossible to give exact figures as to its performance—the output depending as it does so entirely upon the quality, condition and required fineness of the material—it is claimed by the patentees that with about 10 horse-power the mill has already turned out 3000 pounds of phosphate rock per hour, of a fineness between 80 mesh and floats, while a smaller size (22-inch diameter), working by the wet process and using about 8 horse-power, will regularly turn out about one ton per hour of properly ground Turkish emery.

Decrease of Iron Manufacture in France.—The *Journal Official* contains the following statistics of French mines, etc., for 1885 and 1886 : The number of mines at work had sunk from 504 to 476, or a reduction of twenty-eight, and of these only 204 yielded any profit. Two thirds of the mines which are worked are collieries, and they employ nine tenths of all the miners, and had an output of 19,500,000 tons of coals, 500,000 less than in 1884, and 2,000,000 less than in 1883. The selling price fell 60 centimes, as compared to the year before ; still the selling price at the mines reached 11·73 f. per ton. The cost of getting fell 43 centimes from that of 1884. The number of work people engaged was 111,500, nearly 10,000 fewer than in 1884, and 15,000 less than in 1883. There was an increase of output of 543,000 tons in 1886 against that of 1885. The decrease in the production of iron is remarkable. In 1883 it amounted to 2 million tons of cast-iron and 1½ million tons of manufactured iron and steel ; in 1884, 1,872,000 tons of crude, and 1,380,000 tons of iron and steel ; in 1885, the two quantities were 1,634,000 tons and 1,336,000 tons ; and in 1886, 1,508,000 tons and 1,234,000 tons. The number of steam engines working steadily increased, but for the most part in small factories and in agriculture, while those in large industrial establishments decreased. The number of steam vessels, curiously enough, has remained almost stationary, although, by the law of 1883, the State has paid to the commercial marine—as premiums for registered bought vessels, for building new ones, and on cargo freights—a sum of 26 million francs, not reckoning the regular subventions to post steamers. Equally noteworthy is the fact that the number of locomotives on the railways had decreased from 9241 to 9150, although 1461 kilometers of new lines had been opened.

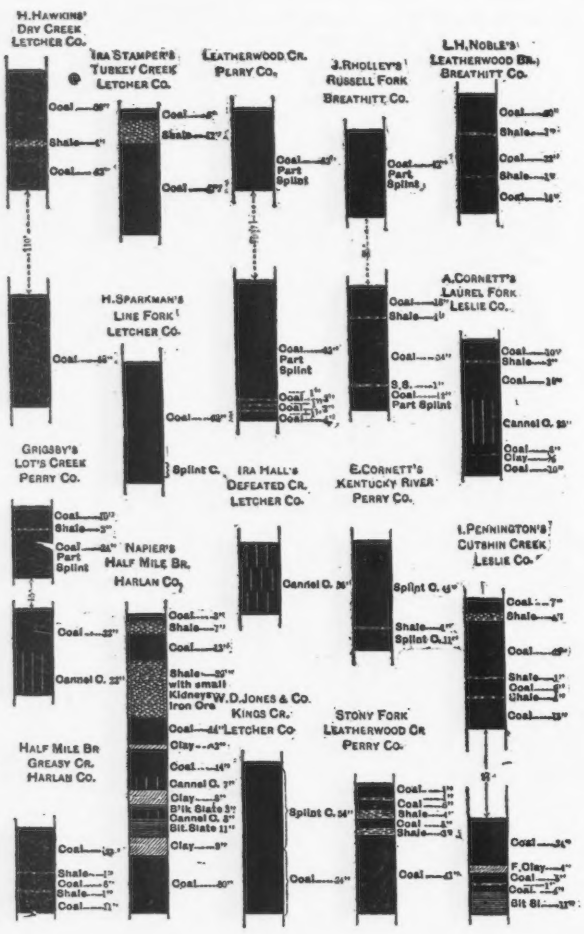
THE MINERAL RESOURCES OF KENTUCKY.

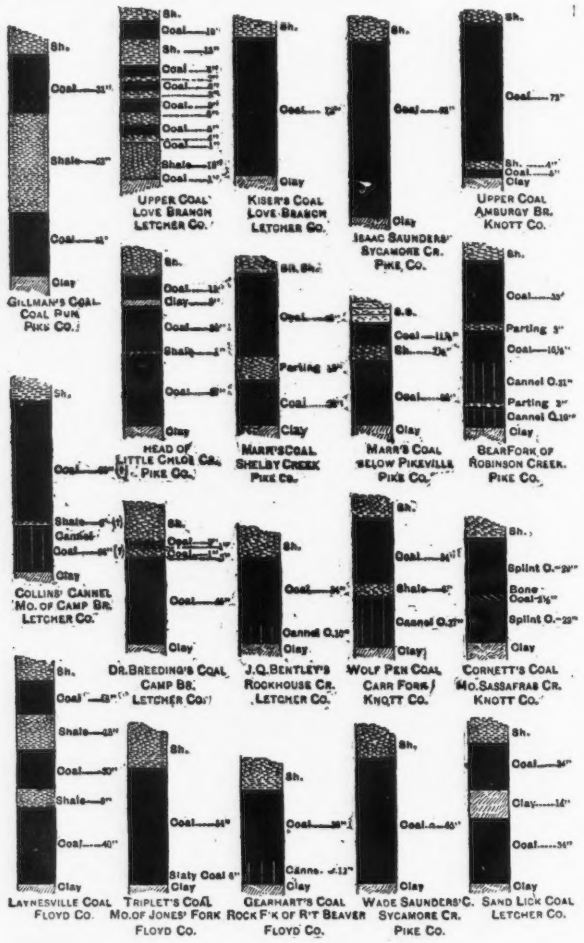
Written for the Engineering and Mining Journal by Prof. John R. Procter, State Geologist.

Kentucky is the only State in the Union containing parts of each of the two great coal-fields, having about 10,000 square miles of the Appalachian coal-field in the eastern part and about 4000 square miles of the Illinois coal-field in the western part of the State.

WESTERN COAL FIELD.

The Western coal-field is a broad synclinal, having its axis almost parallel with the general direction of Green River, and crossed by gentle undulations running slightly north of east and south of west. The conglomerate sandstone at the base of the coal measures is not so thick as in Eastern Kentucky. Above this conglomerate twelve workable coals are present. Some of these coals are of excellent quality, but the percentage of ash and sulphur is greater than in the best of the Eastern Kentucky coals. A strong coke has been made from at least one of the upper coals, having, however, in the coke from unwashed coal a higher percentage of sulphur


H. HAWKINS' DRY CREEK LETCHER CO.
IRA STAMPER'S TURKEY CREEK LETCHER CO.
LEATHERWOOD CR. PERRY CO.
J. RHOLLEY'S RUSSELL FORK BREATHITT CO.
L.H. NOBLE'S LEATHERWOOD BR. BREATHITT CO.
H. SPARKMAN'S LINE FORK LETCHER CO.
A. CORNETT'S LAUREL FORK LESLIE CO.
GRIGSBY'S LOT'S CREEK PERRY CO.
IRA HALL'S DEFEATED CR. LETCHER CO.
E. CORNETT'S KENTUCKY RIVER PERRY CO.
NAPIER'S HALF MILE BR. HARLAN CO.
I. PENNINGTON'S CUTSHIN CREEK LESLIE CO.
W.D. JONES & CO. KINGS CR. LETCHER CO.
STONY FORK LEATHERWOOD CR PERRY CO.
HALF MILE BR GREASY CR. HARLAN CO.


UPPER COAL LOVE BRANCH LETCHER CO.
KISER'S COAL LOVE BRANCH LETCHER CO.
ISAAC SAUNDERS' SYCAMORE CR. PIKE CO.
UPPER COAL AMBURGY BR. KNOTT CO.
GILLMAN'S COAL COAL RUN PIKE CO.
HEAD OF LITTLE CHLOE CR. PIKE CO.
MARR'S COAL SHELBY CREEK PIKE CO.
MARR'S COAL BELOW PIKEVILLE PIKE CO.
BEAR FORK OF ROBINSON CREEK. PIKE CO.
COLLINS' CANNEL MO. OF CAMP BR. LETCHER CO.
DR. BREEDING'S COAL CAMP BR. LETCHER CO.
J.Q. BENTLEY'S ROCKHOUSE CR. LETCHER CO.
WOLF PEN COAL CARR FORK KNOTT CO.
CORNETT'S COAL MO. SASSAFRAS CR. KNOTT CO.
LAYNESVILLE COAL FLOYD CO.
TRIPLETT'S COAL MO. OF JONES' FORK FLOYD CO.
GEARHART'S COAL ROCK F'K OF R'T BEAVER FLOYD CO.
WADE SAUNDERS' COAL SYCAMORE CR. PIKE CO.
SAND LICK COAL LETCHER CO.

than is desirable. Recent experiments lead to the hope that a furnace coke may be made from the first coal above the conglomerate (No. 1.)

This field has now excellent transportation facilities. Green River traverses the entire field from south to north, giving reliable slack water navigation from Bowling Green to the Ohio River. One railway traverses the center of the field from east to west, and two railways from north to south, and two important new roads are being now completed and others are projected.

There is an abundant supply of cheap iron ores convenient to the coals of Western Kentucky.

Associated with the coals of the lower measures in the counties of Grayson, Edmonson, Butler, and Muhlenberg are stratified carbonates and limonites ranging from two to five feet and upwards in thickness, and persistent over a wide area.

Analyses from carefully averaged samples from workable deposits in each of the above named counties give the following from the unroasted ore:

	Per cent.			
Metallic iron	40·48	42·31	45·10	48·88
Silica	14·36	22·40	14·20	12·73
Alumina	..	4 83	6·98	3·91
Phosphorus	0·41	0·28	0·39	.....

A very pure limestone is convenient to these ores.

On the western border of the coal-field in the counties of Crittenden, Caldwell, Livingston, Lyon, and Trigg are large deposits of limonite in the sub-carboniferous limestone.

The following are analyses from carefully averaged samples from five outcrops in the above named counties. Analyses from unroasted and unwashed ores:

	Per cent.			
Metallic iron	46·28	48 86	49·84	50·184
Silica	22·33	11·98	12·10	16·960
Lime	....	2·12	2 87	.....
Alumina	1·06	2 98	3·01	.....
Phosphorus	0·18	0 09	0·09	0·095

These are similar to the ores in Alabama and Tennessee on which the iron industries of Sheffield and Decatur are predicated. Furnaces located near the mouth of the Tennessee and Cumberland rivers in Kentucky wil have the advantage of a large local supply of ores, with the Alabama and Tennessee ores brought *down* stream in the direction of the markets, and the Iron Mountain ores of Southwest Virginia and the Green River ores, all delivered by cheap water transportation.

In addition to the pure limestone contiguous, there are large deposits of fluor-spar, associated with galena, near the above mentioned ores of Western Kentucky. The peculiar advantages of water and rail transportation, with an abundances of coal, iron ores, limestone and timber for charcoal should lead to the establishment of furnaces in this region, and also in the valley of Green River. The Western coal-field has exceptional advantages for supplying the markets of the lower Ohio and Mississippi rivers with coal.

EASTERN COAL-FIELD.

Resting upon the southeastern slope of the great anticline of Central Kentucky, the coal measure rocks dip gently to the southeast until interrupted by the Great Pine Mountain fault, extending from the "Breaks' of Big Sandy River to near Jellico, on the Tennessee line. As the hills increase in height, the thickness of the measures and the number of coals increase to the southeast, until we have north of Pine Mountain the following coals, counting from the western outcrop upwards: two coals below the conglomerate, one a reliable bed from 36 to 48 inches; Combs' coal, first coal above conglomerate, 12 to 36 inches, not given a number; Sand Lick coal, 36 to 60 inches (Coal No. 1); Wright's coal, 12 to 42 inches; Elkhorn coal (coking seam), 40 to 108 inches (Coal No. 3); upper splint coal, 36 to 80 inches; Kiser's 72-inch coal (Letcher); Bear Fork cannel (Pike); coal with many partings; Ambergy's 80-inch coal (Knott); Sycamore Creek 92-inch coal (Pike); Flat Woods coal, Pike County, reported as a thick bed.

In the Big and Little Black and Log mountains, in the synclinal trough between the Pine and Cumberland mountains, through the counties of Letcher, Harlan, Bell and Knox, the above section is not only present but additional coals in higher measures. The mountains reach an altitude of 4000 feet above sea, and the vertical thickness of coal measures is probably greater here than is found at any one place in the United States.

Two claims may be made for the Eastern Kentucky coal-field: (1) That it contains the largest known area of rich and thick cannel coals, and (2) it contains the largest known area of thick and pure coking coals. Cannel coals of workable thickness are found in sixteen of the counties of the Eastern coal-field, and many of these coals are remarkable for richness and purity. The following analyses from averaged samples will show the general good quality of the coals :

	1	2	3	4	5	6
Volatile combustible matter....	49·130	43·400	44·160	66·280	53·800	50 06
Fixed carbon.....	41·920	46·300	49·400	29·730	45 000	40 14
Ash	7 150	8·300	6 000	3·640	5 540	8·40
Sulphur.....	0·802	0·689	0·766	0·830	0·722	1 65

1. Cannel coal, Johnson County. 2. Cannel coal, Pike County. 3. Cannel coal, Perry County. 4 and 5. Cannel coal, Breathitt County. 6. Cannel coal, Morgan County.

When the projected roads shall penetrate Eeastern Kentucky these cannel coals will find a market all over the country for domestic use, and for the manufacture and enriching of gas.

The main *coking coal* of Eastern Kentucky has been named the Elkhorn coal, from the stream of that name in Pike County, where it was first found and proven to be a coking coal. Since its discovery a few years since this bed has been identified and traced as a thick coal over an area of more than 1600 square miles, and has been proven by tests to produce an excellent coke over an area of more than 1000 square miles. It has been traced as a thick bed above drainage through Pike, Letcher and Harlan counties, and over a large part of Floyd, Knott, Leslie, Perry, and Bell counties. It has also been identified as a workable coal in Wolfe, Clay, and Breathitt counties.

This coal attains its greatest thickness in Letcher, Pike, and Harlan counties and in Wise County, Va., where it has been named by Prof. Stevenson the Imboden seam; but it is thick enough for profitable mining, when transportation is secured, in all of the counties mentioned above. For over 1000 square miles it is found as a coking coal, with a thickness of from 6 feet to 9 feet, most favorably located for cheap mining.

The following analyses, made by the Kentucky Geological Survey from carefully averaged samples, show the excellence of this coal over a wide area :

ANALYSES OF KENTUCKY COALS.

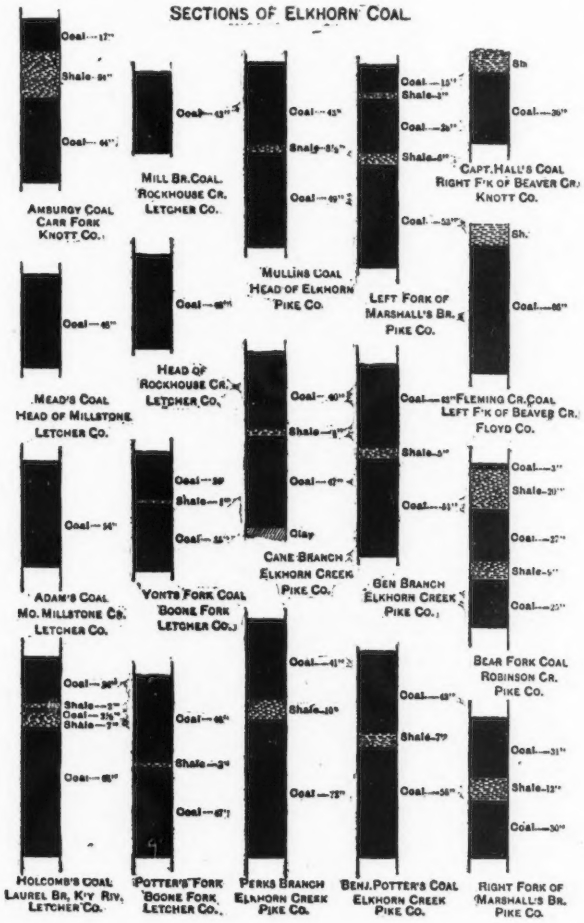
No.	County.	Volatile combustible matter.	Fixed carbon.	Ash.	Sulphur.
1	Letcher...	34·30	58·10	6·50	0·890
2	Pike...	26·80	67·60	3·80	0·967
3	Pike	33·50	60·54	3·96	0·429
4	Wolfe	37·50	55·70	4·40	0·895
5	Bell.....	37·90	57·78	3·12	1·030
6	Bell.....	38·60	57 30	2·70	0·629
7	Harlan.....	36·70	58·86	2·24	0 277
8	Harlan.....	35·30	58·24	3 36	1·290

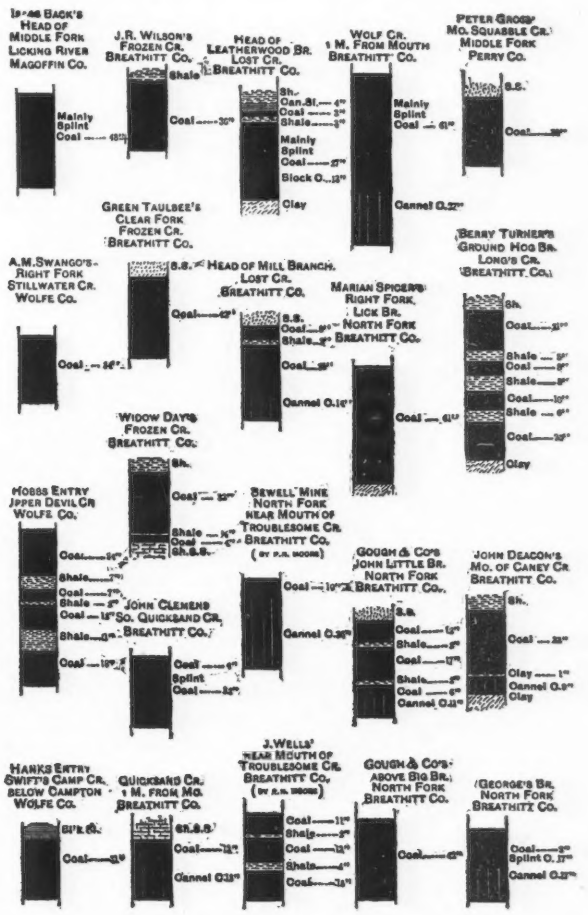
Repeated tests have demonstrated that a superior coke can be made from these coals, and these cokes have been tested for strength and porosity with most satisfactory results. The following analyses show that the cokes from these coals possess three requisites of a good blast-furnace fuel—high fixed carbon, with low sulphur and ash :

KENTUCKY COKES.

County.	Fixed carbon.	Ash.	Sulphur.	Made from sample No.
Pike.....	94·14	4·66	1·484	2
Pike.....	95·40	3·50	·517	3
Wolfe.....	91·00	4·60	·503	4
Bell.....	95·80	4 00	1·710	5
Bell.....	94 00	5 60	·629	6
Harlan.....	93·10	6·30	·546	7
Harlan.....	93·60	6·00	1·068	8

As yet this coking coal field has not been reached by railways, but roads now in process of construction will penetrate it within the next twelve months, when a great development may be confidently expected.


SECTIONS OF ELKHORN COAL.
AMBURGY COAL CARR FORK KNOTT CO.
MILL BR. COAL. ROCKHOUSE CR. LETCHER CO.
MULLINS COAL HEAD OF ELKHORN PIKE CO.
LEFT FORK OF MARSHALL'S BR. PIKE CO.
CAPT. HALL'S COAL RIGHT F'K OF BEAVER CR. KNOTT CO.
MEAD'S COAL HEAD OF MILLSTONE LETCHER CO.
HEAD OF ROCKHOUSE CR. LETCHER CO.
FLEMING CR. COAL LEFT F'K OF BEAVER CR. FLOYD CO.
ADAM'S COAL MO. MILLSTONE CR. LETCHER CO.
VONTS FORK COAL BOONE FORK LETCHER CO.
CANE BRANCH ELKHORN CREEK PIKE CO.
GEN BRANCH ELKHORN CREEK PIKE CO.
BEAR FORK COAL ROBINSON CR. PIKE CO.
HOLCOMB'S COAL LAUREL BR. K'Y RIV. LETCHER CO.
POTTER'S FORK BOONE FORK LETCHER CO.
PERKS BRANCH ELKHORN CREEK PIKE CO.
BENJ. POTTER'S COAL ELKHORN CREEK PIKE CO.
RIGHT FORK OF MARSHALL'S BR. PIKE CO.


J.R. WILSON'S FROZEN CR. BREATHITT CO.
HEAD OF LEATHERWOOD BR. LOST CR. BREATHITT CO.
WOLF CR. 1 M. FROM MOUTH BREATHITT CO.
PETER GROSS' MO. SQUABBLE CR. MIDDLE FORK PERRY CO.
GREEN TAULBEE'S CLEAR FORK FROZEN CR. BREATHITT CO.
BERRY TURNER'S GROUND HOG BR. LONG'S CR. BREATHITT CO.
A.M. SWANGO'S RIGHT FORK STILLWATER CR. WOLFE CO.
HEAD OF MILL BRANCH LOST CR. BREATHITT CO.
MARIAN SPICER'S RIGHT FORK LICK BR. NORTH FORK BREATHITT CO.
WIDOW DAY'S FROZEN CR. BREATHITT CO.
HOGGS ENTRY UPPER DEVIL CR. WOLFE CO.
BEWELL MINE NORTH FORK NEAR MOUTH OF TROUBLESOME CR. BREATHITT CO. (BY P.B. BOOM)
GOUGH & CO'S JOHN LITTLE BR. NORTH FORK BREATHITT CO.
JOHN DEACON'S MO. OF CANEY CR. BREATHITT CO.
JOHN CLEMENS 15 M. SO. QUICKSAND CR. BREATHITT CO.
HANKS ENTRY SWIFT'S CAMP CR. BELOW CAMPTON WOLFE CO.
QUICKSAND CR. 1 M. FROM MO. BREATHITT CO.
J. WELLS' NEAR MOUTH OF TROUBLESOME CR. BREATHITT CO. (BY P.B. BOOM)
GOUGH & CO'S ABOVE BIG BR. NORTH FORK BREATHITT CO.
GEORGE'S BR. NORTH FORK BREATHITT CO.

The following streams head in the area containing this coal and radiate from it in a manner to afford easy routes for railways to penetrate it from every direction, viz.: The Pound, Elkhorn, Beaver and Shelby forks of the Big Sandy to the northeast; the Kentucky River to the north and northwest; the Cumberland River to the southwest; the north forks of the Powell's River to the southwest and south; and the Guest River to the southeast.

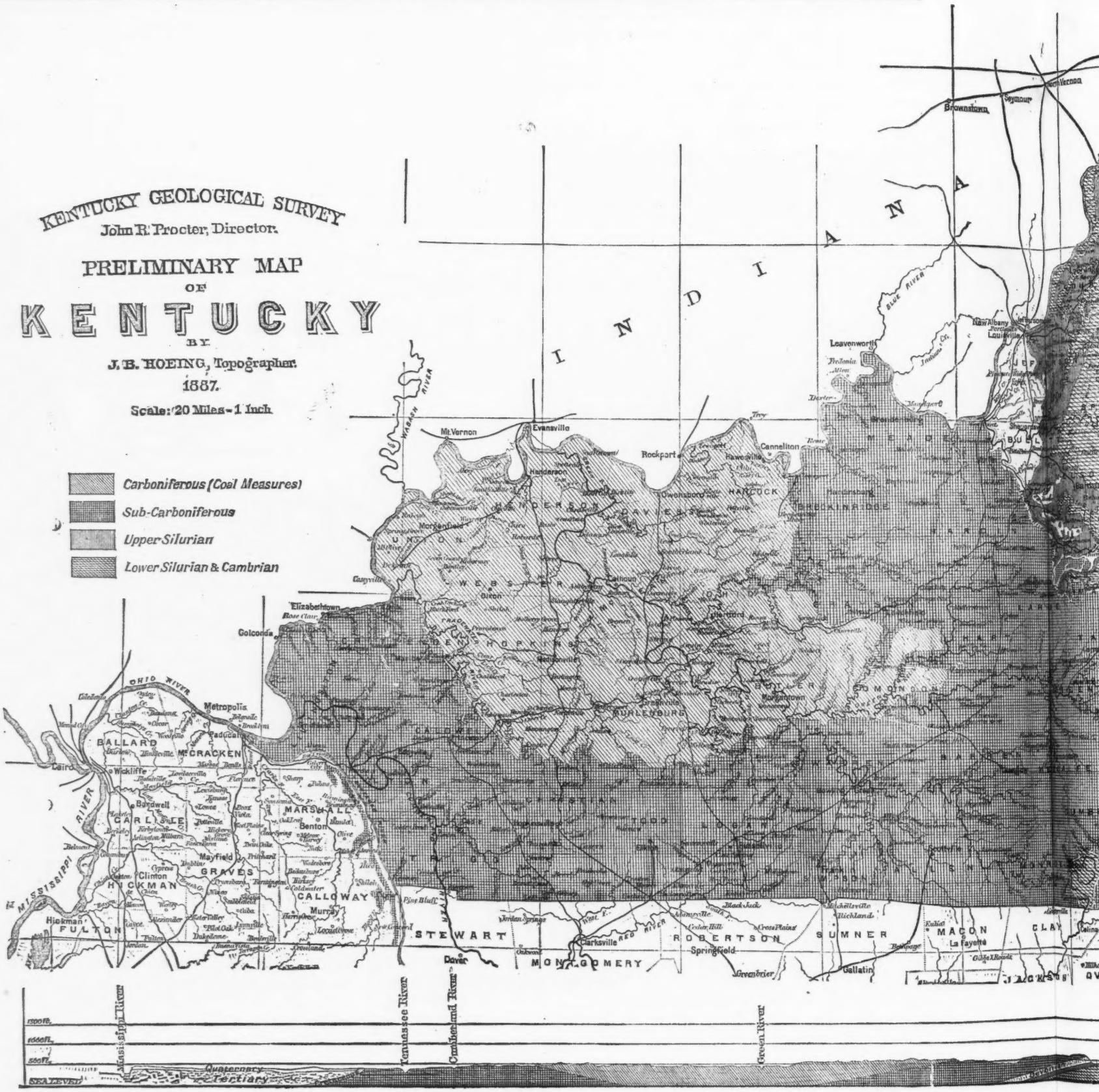
The central position of this coal and its nearness to high grade and cheap iron ores adds much to its value.

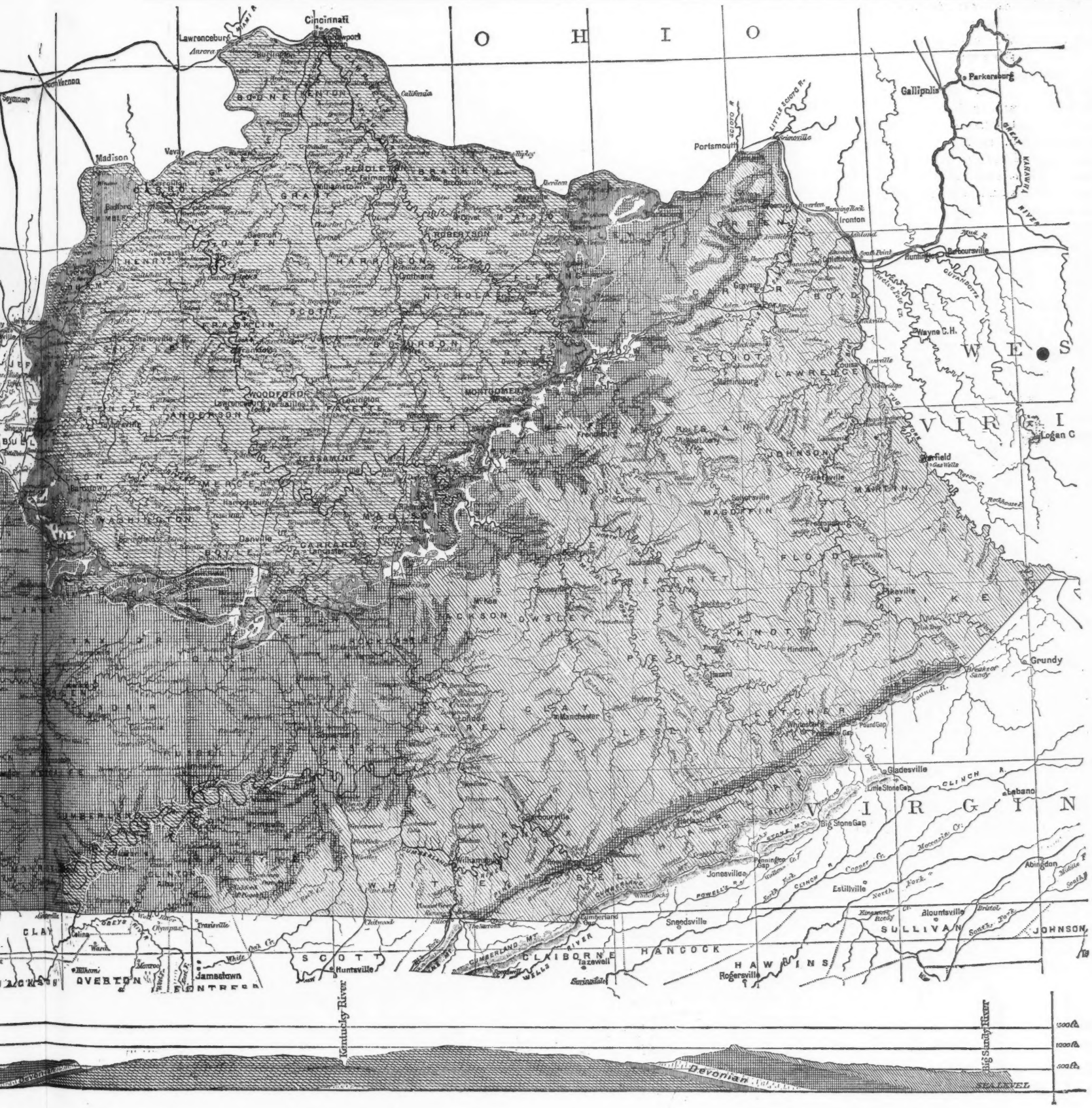
It is the nearest coking coal to Cincinnati and Louisville and the nearest good coking coal to St. Louis. It is as near Chicago as is the Connellsville coking coal, and it is nearer to large deposits of Bessemer steel ores than is any other coking coal in this country.

IRON ORES AND OTHER MINERALS.

In the northeastern part of the State we have the limestone ores and the coal measure ores of the Ashland District. In Bath County there is an excellent ore, now being extensively mined in the upper part of the Upper Silurian, and lower in the series in the same county the Clinton ore is in workable thickness over a wide area. In Menifee, Powell, Estill, and other counties an excellent ore rests upon the top of the subcarboniferous limestone. From this ore the well-known Red River car-wheel charcoal iron has been made. The position of this ore is brought up by the Pine Mountain fault, and the indications are favorable for finding this ore near the coking coal, and possibly an ore belonging lower in the series along the base of the same mountain.

But it is the rich and pure ores of East Tennessee, Southwest Virginia, and Western North Carolina that will look to this region for the supply


KENTUCKY GEOLOGICAL SURVEY
John R. Procter, Director.
PRELIMINARY MAP
OF
KENTUCKY
BY
J. B. HOEING, Topographer.
1887.
Scale: 20 Miles = 1 Inch.
Carboniferous (Coal Measures)
Sub-Carboniferous
Upper Silurian
Lower Silurian & Cambrian
INDIANA
ILLINOIS
KENTUCKY
Mt. Vernon
Evansville
Henderson
Rockport
Hawesville
Cannelton
Owensboro
Leavenworth
Brownstown
Seymour
New Albany
Louisville
Elizabethtown
Golconda
Metropolis
Paducah
Cairo
Wickliffe
Bardwell
Mayfield
Clinton
Hickman
Fulton
Murray
Benton
Dixon
Calhoun
Morganfield
Madisonville
Hopkinsville
Bowling Green
Glasgow
Elkton
Russellville
Greenville
Central City
Princeton
Eddyville
Cadiz
Canton
Pembroke
Hopkinsville
Clarksville
Springfield
Dover
Pine Bluff
Lebanon
Campbellsville
Columbia
Somerset
Burkesville
Monticello
Albany
Jamestown
Tompkinsville
Scottsville
Glasgow Jct.
Gallatin
Hartford
Owensboro
Morgantown
Nashville
Murfreesboro
Lebanon
Gallatin
Springfield
Clarksville
Dover
Pine Bluff
Jordan Springs
Black Jack
Cedar Hill
Cross Roads
Mansville
Michlandsville
Forksville
Lafayette
Glasgow Jct.
Scottsville
Tompkinsville
Albany
Jamestown
Monticello
Somerset
Columbia
Campbellsville
Lebanon
Bardstown
Elizabethtown



IPPI RIVER TO MOUTH OF BIG SANDY RIVER

quality of this ore is shown by the following analysis made from an averaged sample by expert for tenth census :

Metallic iron	64·64
Phosphorus	0·004
Silica	5·27
Lime	1·46

This ore is now being shipped, and used successfully in the manufacture of Bessemer steel.

The Bessemer steel ores of the Lake Superior region are over 700 miles from the nearest coking coal, while this ore is less than 100 miles from the coking coal under discussion, and between this coking coal and the abundant magnetic ores of Western North Carolina are to be found in greatest abundance the entire range of iron ores. Assuming Cleveland and Pittsburg as the natural meeting points for Connellsville coke and Lake Superior iron ores, the cost of the raw material (coke, limestone, and ore) necessary for the manufacture of a ton of Bessemer pig, will be at least $5 more than will be the cost of similar materials at favorable localities between the Kentucky coke and the North Carolina ores; and the difference in cost of materials necessary to make a non-Bessemer pig will be yet greater and more in favor of the same region. Four railway lines are being pushed to rapid completion, and will penetrate this region during the coming year, viz.: (1) The Clinch Valley extension of the Norfolk & Western; (2) the South Atlantic & Ohio, from Bristol, Tenn., through Big Stone Gap, and a connection via Big Sandy River Valley with the Eastern Kentucky Railway; (3) the Powell's Valley Railway, from Knoxville to Cumberland Gap; and (4) the Cumberland Valley extension of the Louisville & Nashville Railway to a connection with the Powell's Valley Railroad at Cumberland Gap, and with the Norfolk & Western Railroad at or near Big Stone Gap. A railway is also being located from North Carolina through Eastern Kentucky, and lines are being located, with prospects of being completed, up the valleys of the Big Sandy, the Licking, the Kentucky, and the Cumberland rivers; so that this region, which a year ago was the largest area east of

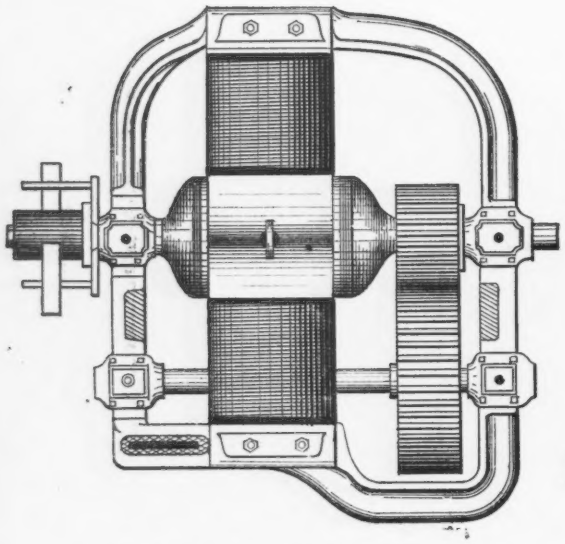
the Mississippi River unpenetrated by railways, will in the coming year have abundant railway facilities.

Six locks and dams have been constructed on the Kentucky River, and the United States government has undertaken to continue the work until slack water navigation is carried to the coals at the "Three Forks" of that river.

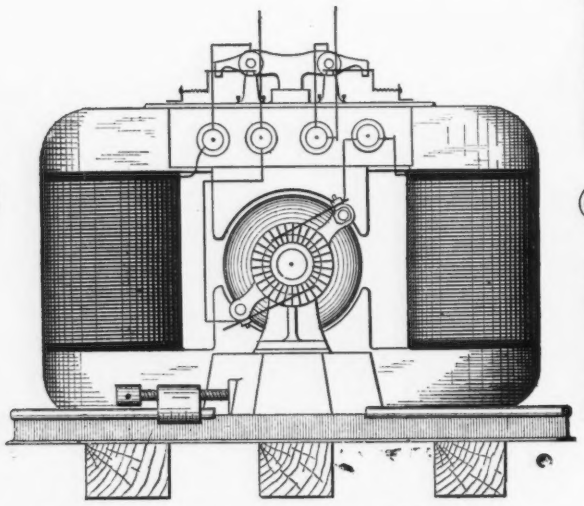
In addition to the abundance of coals and iron ores, the State is fortunate in the possession of large deposits of fire and pottery clays, excellent building stones, large areas of virgin forests of valuable timbers. The many miles of navigable streams, and the railways now building, will insure a rapid development of the abundant resources. The State has always taken a high rank as an agricultural State, and it will soon rank high as a manufacturing State.

ELECTRIC LOCOMOTIVES IN MINES.

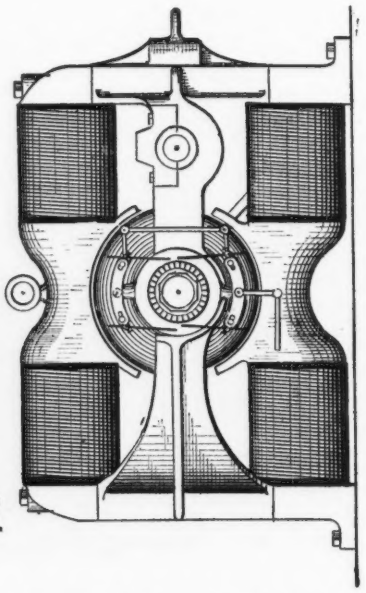
Our readers will remember that the first electric locomotive road in America was built for the Lykens Valley Coal Company, of Pennsylvania, by the Union Electric Company, of Philadelphia, and that it commenced to operate on the 26th of last July. This road is 6300 feet long, and the average train hauled by the motor consists of 31 cars, 380 feet in length. It is drawn round two curves 180 feet apart; one 20 feet 90 degrees, and the other 30 feet 90 degrees; the total gross weight being 150 tons, and the rate of speed 6 miles an hour. The power is supplied by a stationary engine fed with waste coal or with coal dust, and the general working of the plant has been so smooth, effective and satisfactory that it has been decided to adapt the principle to the works below water level, and discard the steam locomotive now in use. The Lykens Valley Coal Company have accordingly ordered a second electric locomotive from the Union Electric Company, and expect to insure from its use not



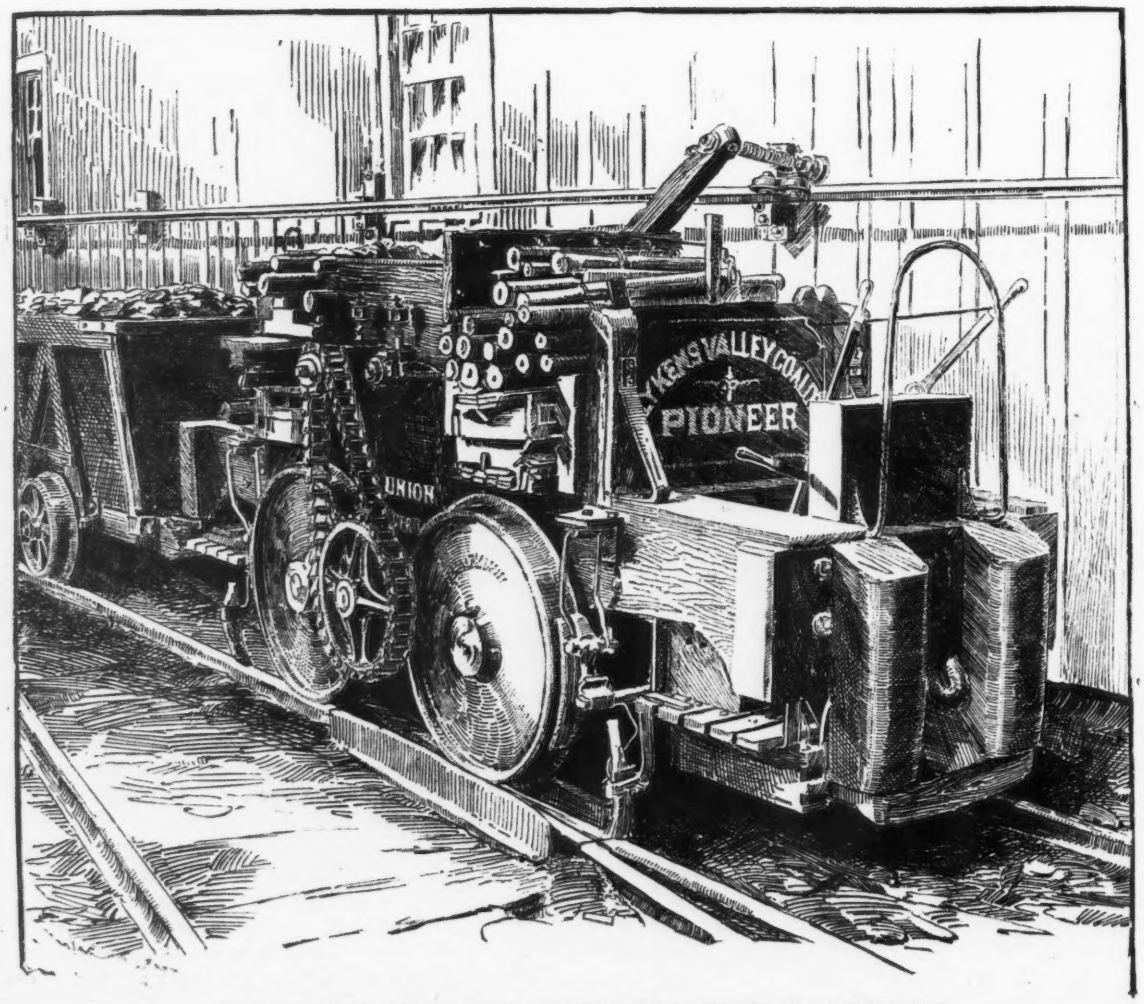
MOTOR, SCHLESINGER RAILWAY—PLAN.



GENERATOR, SCHLESINGER ELECTRIC MINE RAILWAY.



MOTOR, SCHLESINGER RAILWAY—ELEVATION.



THE UNION ELECTRIC COMPANY'S MINE LOCOMOTIVE.

only a considerable economy, but far greater safety. The length of their new electric road will be 8000 feet; the nearest point to the generating station being distant 1600 feet, and 700 feet vertical below the surface. The capacity of the new motor will be the same as that now in use, and the work of road construction has been already actively commenced. We shall watch the further developments of this application of electricity to mining work with the greatest interest, convinced as we are that it will mark a new era in our history of rapid and economical production. The extraordinary manner in which the Lykens plant exceeds in power and length of road any thing that has yet been done in Europe is shown in the following comparative table:

Where running.	System.	Length.	Speed.	Weight of locomotive.	Largest weight pulled.
		Feet.	Miles.	Lbs.	Tons.
Zankeroda	Siemens and Halske.....	2,028	6	3,520	13½
Paulus and Hohenzollern.....	Siemens and Halske.....	2.460	...	4.200	....
Lykens Valley.....	Schlesinger	6,300	6	15,000	150

MODERN AMERICAN METHODS OF COPPER SMELTING.

Prof. S. B. Christy, Professor of Mining and Metallurgy at the University of California, Berkeley, in a letter dated November 7th, says: "Accept my thanks for the copy of Dr. Peters's admirable work, Modern American Methods of Copper Smelting. I shall be very happy to use it here as a text-book, for it certainly has no equal in print on the ground it covers."

Prof. M. E. Wadsworth, Director of the Michigan Mining School at Houghton, Mich., in a letter dated November 14th says: "Dr. Peters's book on Modern American Methods of Copper Smelting is an extremely valuable one, and if we used a work on metallurgy confined to a single product, we should not hesitate to employ it as our text book."

Mr. H. M. Howe, the distinguished metallurgist, in a letter dated Boston, November 5th, says: "Your enterprise in publishing Dr. Peters's Copper Smelting has laid metallurgists under a debt of gratitude. Dr. Peters has had exceptional opportunities for observation, has been connected with several important copper smelting enterprises, and has been associated with others of intelligence, originality, and daring. He has thus had opportunities for observing many important experiments, and of actually testing methods which do not work, as well as those which do, and it is from the former that one usually learns the most. In his book he gives us in a straightforward way the results of many years of experience, he takes us into his confidence, and opens his note-books to us in a most praiseworthy way. The difficulty in getting information about the details of copper metallurgy and the comparative poverty of the literature touching these details render Dr. Peters's book doubly acceptable.

"He has not attempted to be all things to all men, but has prudently seated himself firmly on one stool. Of the two he has chosen to write for practitioners, who need facts in abundance, rather than for students, who need principles first and only enough facts to clearly illustrate these principles and make them tangible realities.

"So intelligent and observing a man could not be actively engaged in copper smelting for so many years without acquiring a great deal of valuable information; without learning very many ways of overcoming or avoiding the many difficulties which occur in practice; without having special information at least on certain points which will be of value even to those of greater experience, to whom these special difficulties or these special solutions have not presented themselves. When he thus comes forward and unbosoms himself, what he has to say must be of interest to all who are actively engaged in copper smelting, whether their chief interest be technical or financial: and I think there are few of these to whom it will not be of value as well as interest, while to the inexperienced smelter it is indispensable."

Method Proposed for Destroying the Phylloxera.—Dr. Clemm has patented the following process in most civilized countries: He incorporates with the soil sulphides and carbonates which easily undergo decomposition, preferably those of potassium. Peat, which has been made to absorb sulphuric, nitric or phosphoric acid, is then also introduced. The acid gradually acts upon the sulphide and the carbonate, liberating sulphureted hydrogen and carbonic acid in the soil. These two gases, according to the experiments of Dr. Eyrich, of Mannheim, are rapidly and uniformly distributed, and prove fatal to the phylloxera in its underground state, as well as to Colorado beetles, field mice, moles, etc. The potash remains in the soil as a sulphate, nitrate or phosphate. Commenting upon this method the *Chemical News* asks whether in addition to the phylloxera, useful animals, such as earthworms, bumble bees, carnivorous ground beetles, etc., will not be destroyed also?

An Improved Earth Plate.—In the *Electrotech. Zeitschrift* for October, Professor Dorn proposes a form of earth plate which should be valuable to all observers of earth currents, if, as is claimed for it, it reduces polarization to a minimum. It consists of a flat open box, made of wood or cement, and coated inside with asphalt. This is placed at the bottom of a hole in the ground. An amalgamated zinc plate lies flat in the box, and an insulated wire leads from it to the surface. Care must of course be taken that the joint is well covered, so that nothing but zinc is in contact with soil. An earthenware pipe stands on the zinc and rises to the surface. The box is then tightly rammed with clay, soaked with concentrated zinc sulphate solution, and the hole filled up. Solid sulphate is dropped down the tube and solution poured after it. A little fresh sulphate from time to time will keep the plate in order.

Atomic Weight of Zirconium.—The previous determinations of the atomic weight of this element were made by Berzelius (89·25), Hermann (88·8), Marignac (90·54). The earlier results were doubtless vitiated by the presence of iron and of the cerite earths, while Marignac's determination is open to objection from the character of the salt—potassium zirconium fluoride—which he used. It has now been determined by Dr. G. H. Bailey, from zirconia prepared from North Carolina zircons by three independent methods. It was dissolved in sulphuric acid, and the sulphate was crystallized out. This salt becomes normal and constant in weight by heating some hours at 400 degrees, the temperature at which it begins to decompose being 470 degrees. The relation of zirconium sulphate to zirconia gives a ratio from which the atomic weight is calculated, and, though the work is not complete enough to state the result with accuracy, the value obtained agrees more nearly with that of Marignac. Dr. Bailey proposes to make further determinations, using the tetrabromide.

A New Method of Assaying Zinc.—The following rapid and accurate method is described by Dr. W. P. Headden, Professor of Chemistry at Denver University: 0·50 gram of the ore is dissolved in concentrated nitric acid, and evaporated to dryness with the addition of a few drops of sulphuric acid at the end. Bromine water or chlorate of potash is then added to precipitate the manganese, when carbonate of ammonia and ammonia are added. The solution is heated and filtered and acidulated with hydrochloric acid. A strip of aluminum foil is then placed in it, when the copper is precipitated in metallic form. Titration with ferrocyanide of potassium then determines the amount of zinc present. The entire assay can be completed, after weighing the charge, in thirty minutes. The addition of a small piece of platinum foil to the solution when the aluminum foil is introduced hastens the precipitation. The copper can be dissolved with concentrated nitric acid, which does not attack aluminum, and if it be desired to determine the copper in the ore, accurate results can be obtained, thus saving time on a copper as well as zinc assay. If there be but a small quantity of manganese in the ore, the bromine water need not be used.

The Siemens Regenerative Furnace Case Decided in Favor of the American Claimants.—A decision was rendered by the United States Supreme Court on the 14th inst., in the case of Charles W. and Frederick Siemens, appellants, against William Sellers and others. Appeal from the Circuit Court of the United States for the Eastern District of Pennsylvania. This is a suit for alleged infringement of a patent granted to the Siemens Brothers, of England, upon their well-known regenerating furnace. The defendants do not deny that the Siemens Brothers were the authors of the ingenious invention covered by the patent, but they deny that they use it. Their contention is that the Siemens Brothers took out an English patent for the same invention on July 19, 1861, and that by force of the acts of 1839 and 1861 the American patent expired at the end of seventeen years from the sealing of the English patent, namely, July 19, 1878. They deny that they used the said invention before the last mentioned date, and no evidence is given that they did so. The questions to be decided, therefore, were whether the English patent was for the same invention as the American patent, and if so, whether the latter was limited to expire at the end of seventeen years from the sealing of the former. The court holds that both of these questions must be answered in the affirmative, and it therefore sustains the decree of the Circuit Court in favor of the American users of the Siemens invention.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in another part of the Journal.]

The Solution of Colliery Explosions. By W. Morgans, C.E., M.E. London. Published by Simpkin, Marshall & Co., London, England. 1887. Pages 100. No Index.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

PATENTS GRANTED NOVEMBER 15TH, 1887.

373,078. Pressure Gauge Attachment for Automatically Controlling Gas Supply. Wm. B. Mann, Baltimore, Md.
373,081. Coal-Mining Machine. Samuel McAllister, Noblestown, Assignor of one half to O. D. Lewis, Pittsburg, Pa.
373,085. Process of and Apparatus for Manufacturing Roofing Material. Henry M Miner, Philadelphia, Assignor to the Granite Roofing Co., Pittsburg, Pa.
373,092. Guide for Stamp-Mills. John D. Peregrine, Central City, Colo.
373,093. Gas Main. Joseph N. Pew, Pittsburg, Pa.
373,103, 373,104. Electric Valve-Controller. George N. Sternberg, U. S. Army.
373,105. Device for Operating the Doors of Mine Shafts. Parker Steves, Aspen, Colo.
373,108. Electric Motor. Elihu Thomson, Lynn, Mass., Assignor to the Thomson-Houston Electric Company, of Connecticuit.
373,109. Pipe-Coupling. Charles Turner, La Crosse, Wis.
373,110. Machine for Gathering Stones. Jacob Van Hosen, Kearney, N. J.
373,134. Brick Machine. William T. Duvall, Washington, D. C., Assignor of one half to Harry W. Blount, same place.
373,139. Air-Injector for Furnaces. Wm. S. Hutchinson, Chicago, Ill.
373,145. Dynamo-Electric Machine and Electro-Motor Willam Main, Brooklyn, N. Y.
373,146. Electro-Motor and Dynamo Electric Machine. William Main, Brooklyn, Assignor to the River and Rail Electric Light Company, New York, N. Y.
373,158. Process of and Apparatus for Manufacturing Gas. Alexander M. Sutherland, Elizabeth, N. J.
373,182. Balanced Slide Valve. Henry T. Giles, Washington, D. C., Assignor of one fourth to Albert M. Crowell, same place.
373,186. Process of Smoking Molds in Casting Ingots. John Illingworth, Newark, N. J.
373,211. Magnetic Separator. Jonas Wenström, Orebro, Sweden.
373,221. Alloy. Craft C. Carroll, Meadville, Pa.
373,237. Boiler Flue Attachment. John Kelly, Blake, Utah.
373,244. Miner's Lamp. John L. Morris, Middleport Pa.
373,255. Hoisting and Conveying Machine. William Thornburgh, Elyria, Ohio.
373,259. Hydraulic Engine. Charles R. Whittier, Yonkers, N. Y.
373,264. Process of Making Pyrosulphates. Heinrich Baum, Mannheim, Germany.
373,283. Self-Oiling Journal Box. Michael Garland, Bay City, Mich.
373,289. Sectional Draw-Rod for Placing Electric Wires in Underground Conduits. William H. Johnstone, Philadelphia, Pa.
373,291. Nail with Countersunk Head. Joseph W. Higgs, Meadville, Pa., Assignor to the Meadville Wire Nail Company, Limited, same place.
373,323. Steam Engine. H. Herman Westinghouse, New York, N. Y., Assignor to the Westinghouse Machine Company, Pittsburg, Pa.
373,324. Automatic Valve-Controller. John Wheeler, East St. Louis, Ill.
373,369. Automatic Regulator for Dynamo-Electric Machines. Charles D. Jenney, Indianapolis, Ind.
373,373. Metallic Roofing. Levi H. Montross, Toronto, Ontario, Canada, Assignor of one half to Dennis Joseph McCurdy, same place.
373,406. Rotary Meter for Gas. Norwood Johnston and Addison B. Carll, Washington, Pa.
373,417. Device for Watering Coke in Ovens. Thomas S. Stewart and James E. Stewart, Saltsburg, Pa.
373,419. Valve Gear for Air Compressors. Edward M. Strange, Brooklyn, N. Y.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(*Continued from page* 351.)

This however is rather slender foundation for hypothesis A, and neither hypothesis is excluded by the other results recorded in Table 41.[a] We are also in doubt as to the formula in accordance with which silicon is oxidized, though we probably err little in assuming that it is

$$3FeO + Si = 2\,Fe + FeSiO_3.$$

Till these formulæ are known the spiegel-reaction method can only give us a rough notion of the percentage of oxygen present when the quantity of manganese reacting is large: but when, as in Nos. 1, 2 and 4, very little manganese reacts, its results should not be far wrong. It is difficult to believe that in these cases anything approaching the 1·74% of oxygen found by Tucker can have been present.

Hydrogen Method.—It may be held that in the 30 to 60 minutes usually employed hydrogen is not likely to completely remove oxygen from the interior of the particles of even fine iron filings: we are led to hope that this source of error need not be serious by the fact that the hydrogen method gave Bender (Nos. 3 and 4, Table 41) almost the same result as the spiegel-reaction method: but these two methods here support each other but feebly. In view of the small percentage of oxygen found by the latter method in Müller's reactions 1 and 4, which cannot be far wrong, serious suspicion of Ledebur's hydrogen-method results (No. 2, Table 41), low as they are, is hardly justified.

Tucker's Method.—The proportion of oxygen found by this method in afterblown steel, ·68 to 1·74%, is much higher than those which I have met obtained by the hydrogen method, or by the spiegel reaction method if interpreted by hypothesis A: but the latter method on hypothesis B finds, in Müller's reactions 5 and 6, 1·79 and 1·76% of oxygen.

Of the three sources of error which suggest themselves in connection with Tucker's method none is likely to have had serious influence. 1. Its results might possibly be slightly depressed by absorption of gases from the atmosphere: but they are so high that suspicion of having been depressed does not arise. 2. They might be exaggerated by the expulsion from the molten metal of hydrogen, nitrogen, carbonic oxide and sulphur initially present along with the oxygen: but the proportion of sulphur in afterblown basic steel is small, and the largest recorded proportions of the three other substances which I have met in commercial irons, say ·01, ·06 and ·05% respectively, would collectively affect Tucker's high results but slightly, would explain but a fraction of the difference between his and Ledebur's. 3. They might possibly be exaggerated by the removal of manganese, silicon, etc.: but these elements are almost completely absent from afterblown steel. Further, the facts that when applied to steel reasonably believed to be approximately free from oxygen it indicated the presence of but ·02% of that element; that, applied to steel mixed with a known weight of oxide, its results "left nothing to be desired"; and that they are harmonious, ·064, ·062 and ·066% of oxygen in a sample of burnt steel, and 1·71, 1·74 and 1·69% in one of blown metal, furnish positive evidence of good character. Hence I infer that the steels treated by Tucker probably contained an unusual proportion of oxygen: it is hardly conceivable that the steel in which he found from 1·69 to 1·74% of oxygen should actually have held anything like as little as those in which the spiegel-reaction method finds at most ·089 and ·124%, and those in which the hydrogen method finds but ·11@·12%, making all possible allowances and supposing that all the possible errors combined to swell the apparent percentage in one case and to depress it in the others.

To Sum Up, while none of these methods inspires absolute trust, we yet have strong reasons for believing that the results of Tucker's method closely approximate the truth, and no serious reason for believing that those of the hydrogen method, or of the spiegel-reaction method when but little manganese and silicon react, are far wrong. But, when much manganese enters into the reaction, the uncertainty as to whether hypothesis A or B be correct leaves the latter method no pretence to accuracy.

§ 167. Oxygen with Carbon.—Though carbon silicon and manganese remove oxygen from molten steel, a small proportion of these elements and of oxygen may coexist: it is stated that ·1 to ·2% of carbon and as much manganese can exist with some hundredths of one per cent of oxygen, while the coexistence of very considerable quantities of oxygen and a little carbon is illustrated by Table 43. Müller describes thoroughly blown steel which contained ·605% of silicon: that it simultaneously contained oxygen is inferred from the violent development of carbonic oxide on subsequently adding spiegeleisen to it.[b]

Table 43.—Oxygen with Carbon, etc., in Iron.

(This table is numbered to correspond with Tables 70 A and 42.)

Number.	Description.	Mode of determining oxygen.	Composition.							
			O.	C.	Si.	Mn.	P.	S.	Cu.	Ni. and Co.
A...	Afterblown basic metal...	.....	·244	·037	·001	0	·038	·059	·046	·064
B..	" " " Ledebur.	....	·187	·123	0	tr	·077	·093	·095	140
C..	" " "	....	·171	·050	0	0	·085	·057	·061	·110
1..	" " " Müller. ..	Spiegel-reaction.	·118a	·029	·016	·188	...	...	....	....
2..	" " " " ...	" " .	·254a	·033	003	·160	...	....	....	....
4	" " " " ...	" " .	·034a	·033	021	·212	...	....	....	....
7..	" " " " ...	" " .	·782a	·002	·002	·083	·078	....	....	....
9..	Decarburized acid Bessemer metal; Müller	" " .	·086a	·046	·122	·248	....	...	....	....
10..	Decarburized acid Bessemer metal; Bender	" " .	·898a	·08	....	....	....	....	...	....
11..	Decarburized acid Bessemer metal: King.....	" " .	·438a	·034	·040	·10	....	..	....	...
D..	Partly recarburized basic Bessemer metal; Müller..... ...	" " .	·041	·039	·014	·353	...	...	....	....
E...	Weld metal; Ledebur.....	....	·177	·052	0	0	·223	tr	·450	·157

a Calculated on hypothesis A; on hypothesis B the percentage of oxygen is larger. See heading to Table 42.

A, B, C, Handbuch der Eisenhüttenkunde, p. 276. Nos. 1 to 11, see corresponding numbers in Table 70 A. D, Stahl und Eisen, IV., p. 72, 1884.

§ 160. Corrosion of Iron.—The readiness with which iron oxidizes, familiar to all through its exasperating proneness to rust, deemed a token and penalty for the blood it has shed, in general increases with its heterogeneousness, with the fineness of its subdivision and with the temperature. It is affected by contact with substances of different potential, zinc and highly zinciferous brasses retarding, bronzes, copper, tin, lead and iron scale hastening corrosion. While it is doubtless affected by the metals composition, we have as yet very little information as to what compositions favor and what oppose corrosion. Skin-bearing cast-iron resists corrosion better than wrought-iron and steel, and the hard close-grained cast-irons better than the softer and more open ones. If its skin be removed, however, cast-iron cannot yet be said to resist corrosion better than malleable iron. Nor can we say which class of malleable iron resists corrosion best:

* Copyright by the Scientific Publishing Company, 1887.

a This question could easily be settled by recarburizing different portions of the same afterblown metal (1) with pure carburetted iron, (2) with very rich ferro-manganese and (3) with very rich ferro-silicon.

b Iron, 1883, p. 18.

TABLE 44.—LOSS OF IRON BY CORROSION, IN POUNDS PER SQUARE FOOT OF SURFACE PER ANNUM.

Number.	Observer.	Metal.	Exposed to weather.	Immersed in cold pure sea water. Unconfined.	Immersed in cold pure sea water. Confined.	Immersed in cold foul sea water. Sewage bearing.	Immersed in cold foul sea water. Bilge water.	Immersed in hot sea water. P. and O. steamer.	Immersed in hot sea water. Boiler with zinc.	Immersed in hot sea water. Boiler impure water.	Immersed in hot sea water. Pure sea water at 46° C., 115° F.	Immersed in fresh water. Pure river.	Immersed in fresh water. Foul river.	Immersed in cold sea water in voltaic contact with. Bright wrought-iron.	Scale-bearing iron.	Copper.	Bronze.	In acidulated water.
1..	Mallet.	Green sand,	·059	·069	...	·073	. ..	....	....	...	·063	·01	·028	....	....	·22	·38	....
2..	"	Chilled, Cast-iron	·02	073	...	·064	...	....	....	....	·117	·01	·029	. ..	....	...	...	....
3..	"	Planed, Cast-iron	·098	·098	...	·253	....	....	....	....	·270	012	·050	....	....	....	....	....
4..	"	Painted, Cast-iron	·013	·082	....	·138	....	...	....	....	·048	·010	·060	....	....	....	....	....
5..	"	Standard, Wrought-iron	·081	·089	....	·128	....	.. .	....	....	·277	·021	·057	....	....	·44	·58	....
6..	"	Aver. of 17, Wrought-iron	·138	·121	....	·215	....	....	....	...	....	·013	·158	....	....	.. .	. .	....
7..	"	Zinced.	0	·039	....	·088	....	....	....	....	...	·005	·041	. ..	....	...	....	....
8..	"	Steel, average of 7	·117	·107	....	·214	....	...	....	....	....	·013	·125	...	...	...	....	...
11..	Andrews.	Cast-iron	....	....	·035	....	....	...	....	....	....	....	....	·036	·086	·122	....	....
12..	"	"	...	...	·024	...	....	...	....	....	....	....	....	·030	. ..	....	....	....
13..	"	Wrought-iron	....	....	·023	....	....	. ..	....	....	....	....	....	....	·053	·113	....	....
14..	"	"	....	....	·019	....	....	....	....	....	....	....	....	....	....	....	....	....
15..	"	Bessemer, Soft steel	....	....	·022	..	....	....	....	....	....	....	....	·035	·059	·103	....	....
16..	"	Open-hearth, Soft steel	....	....	·021	....	....	....	...	....	....	....	.....	·036	·073	·074	. ...	....
17..	"	Crucible. Soft steel	....	....	·031	....	....	....	....	....	....	..	....	·036	·081	·109	....	....
18..	"	Bessemer, Hard steel	....	....	·027	....	. ..	....	....	....	....	....	....	·036	·060	·111	....	....
19..	"	Open-hearth, Hard steel	....	...	·024	....	....	....	. ..	....	....	....	....	·031	·076	·117	....	....
20..	"	Crucible. Hard steel	....	....	·025	....	....	....	....	....	....	....	....					
23..	Parker.	Landore, Soft steel	·206	·208	....	....	·480	·234	·120	·666	....	....	....	....	....	....	....	....
24..	"	Brown, Soft steel	·254	·215	...	....	·560	·310	·147	·755	...	....	....	....	....	....	....	....
27..	"	Bolton, Soft steel	·214	·198	....	....	·544	·250	·117	·785	....	. ..	....	....	.. ..	....	...	....
28..	"	Steel Co. of Scotland. Soft steel	·222	·207	....	....	·509	·258	·132	·739	....	....	....	....	....	....	....	. .
29..	"	Taylor, Wrought-iron	·169	·168	....	....	·475	·164	·061	·609	....	....	....	....	....	....	...	....
30..	"	Leeds, Wrought-iron	·155	·198	...	....	·527	·191	·066	·657	....	....	....	....	....	....	....	....
31..	"	Bowling, Wrought-iron	·150	·225	....	....	·518	·193	·052	·598	....	....	....	....	....	....	....	...
32..	"	Farnley. Wrought-iron	·167	·173	. ..	....	·573	·217	·069	·708	....	....	....	....	..	....	....	..
33	"	Lowmoor, Wrought-iron	·166	·212	....	....	·589	·209	·087	·597	....	....	....	....	....	....	. ..	. ..
34..	Gruner.	Grey, Cast-iron	28@·37	1·45	....	....	....	....	....	....	....	....	....	....	....	....	....	.....
35..	"	"	"	2·07	...	....	....	....	...	....	....	....	....	....	....	....	....	19·87
36	"	Spiegeleisen,	"	2·90	....	....	....	....	....	....	....	....	....	....	....	....	....	11·12
37..	"	Charcoal.	"	. ..	....	....	....	...	....	....	....	....	....	....	....	....	....	1·87
38..	"	Soft steel,	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
39..	"	" "	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	·12@·50
40..	"	Manganese steel annealed	·56@·75	·41@ 83	....	....	....	....	....	....	....	....	....	....	....	....	....	1@1·37
41..	"	" " hardened.			...	....	....	....	....	....	....	....	....	....	....	....	....	2
42..	Farqu-	Wrought-iron	....	·118	....	....	....	....	....	....	....	....	....	·22	....	....	....	5·12
43..	harson.	Soft steel	....	·126	....	....	....	....	....	....	....	....	....	·046	....	....	....	....
44..		Wrought-iron	·138	·121	....	·215	....	....	....	....	....	....	....	....	....	....	....	....
45..	Thwaite's	Steel, miscellaneous	·137	·107	....	·214	....	....	....	....	....	....	....	....	....	....	....	...
46..	averages.	Cast-iron	·054	·070	....	·072	....	....	....	....	....	....	....	....	....	....	....	....
47..		" galvanized	·022	·039	....	·088	....	....	....	....	....	....	....	....	....	....	....	....

1 to **8**. Five apparently exactly similar sets of specimens, each consisting of 11 pieces of green-sand castings, 5 × 5 × 1, apparently retaining their skin, 6 of them unprotected (No. 1), 5 of them painted or varnished (No. 4); 5 specimens of unprotected chilled cast-iron 5 × 5 × 1, four of them differing from four of the preceding only in being chilled (No. 2); 1 of unprotected gray cast-iron (No. 3) with its skin removed by planing; and 1 of unprotected wrought-iron (No. 5) about 5 × 3 × 0·875. These were exposed as follows. (1) In clear sea water at 46° to 58° F. for 732 days: (2) In foul sea water, close to the mouth of the Great Kingston main sewer at 46° to 58° F. for 732 days. (3) In pure sea water at 115° F., for 117 days: (4) In clear unpolluted water of the River Liffey, at 32° to 68° F. for 732 days; (5) In foul river water with much organic matter, in the same river at Dublin, the bottom soft putrid mud, temperature 36° to 61° F., for 732 days: (6) To the weather on the summit of an exposed building in Dublin, for 539 days. In addition these were simultaneously exposed to condition (1) 64 pieces of unprotected green-sand cast-iron, apparently retaining their skin, and mostly either 5″ × 5″ × 1″ or 5″ × 5″ × 0.25″ (No. 1); and to all the conditions except (3) apparently exactly similar sets each consisting of 17 pieces of wrought-iron of various kinds (No. 6), 7 of steel (No. 8) (blister, shear, spring, etc., apparently all of high-carbon steel) and one of galvanized wrought-iron (No. 7), all except the last apparently unprotected. Moreover, bars of the "standard" wrought-iron (No. 5) were immersed in cold sea water in contact with copper, zinc, and various brasses and bronzes (*i. e.* copper-zinc and copper-tin alloys). [Tables III. and VII., pp. 286, 299, Rept British Asso., 1840; Tables I. to XIII. inclusive, pp. 30 to 51, Idem, 1843.]

11 to **20**. Thomas Andrews, Proc. Inst. Civ. Engrs., LXXXII., p. 281, 1885. In these experiments the metal was immersed in confined cold sea water in glass or wooden vessels, the sea water being generally changed every month and the loss by evaporation being frequently made good by addition of distilled water. In every case the rusting proceeded very much more slowly than in the experiments of other observers in which the water was unconfined. This suggests that, by the reaction between the metal and the sea water, the latter rapidly loses its corrosive power. Should this be true, it might possibly be taken advantage of by preventing the circulation of the sea water surrounding important submerged structures. The simple immersion in cold sea water lasted 378 days: that in contact with bright wrought iron plates lasted 770 days: those in contact with scale-bearing iron plates and with copper plates each 112 days. These are the periods at the end of which the results in Table 44 were obtained. In certain cases the experiments were further prolonged, with results on the whole similar to those here given. If I understand him correctly, the results in the column headed "Scale-bearing iron" are the losses suffered by bright iron, etc., when a bright plate of each kind was galvanically connected with a similar but scale-bearing plate of the same metal, each of these couples being immersed in a separate jar, and all being coupled together in series.

23 to **33**. Parker, Journ. Iron and St. Inst., 1881, I., p. 39. On each of six glass-coated rods were placed 22 discs 4·5 inches in diameter and about 0·05 inch thick. Each set contained one bright and one scale-bearing disc from each of seven lots of wrought-iron and of four lots of mild steel, from 11 different makers. The results obtained with two lots of "common" wrought-iron are omitted in the table. One set was suspended for 455 days on a London roof: a second was attached under water to the Brighton pier for 437 days: a third was submerged for 240 days in bilge water in an Eastern trading vessel. Three sets were submerged in marine boilers, one of which contained zinc and was blown off as seldom as possible; the immersion lasted 361 days: the second was in a "Peninsular and Oriental" steamship, and was blown out at each terminal port and filled afresh with salt water; the immersion lasted 264 days: the third was in a steam collier using Tyne water, probably acidulated by local chemical works; the immersion lasted 336 days. In this boiler corrosion was extremely rapid, both for iron and steel.

34 to **41**. Gruner, Revue Universelle, XIII., p. 659, 1883. Twenty-eight polished plates of steel and cast-iron of different degrees of hardness and purity, each 3·937 inches square, were exposed under three sets of conditions. One set was exposed to moist air for 20 days, a second was immersed in sea water for 9 days, a third was immersed in water acidulated with 0·5% of concentrated sulphuric acid for three days. In air chrome steels corroded more and tungsten steel less than common steel. In sea water hardened steels corroded less than the same steels when annealed, the soft steels less than the manganese and chrome steels, and tungsten steel less than common steel of like carbon content. It will be noticed that in these experiments the corrosion is very much more rapid than in the others, possibly because the exposures were so brief. These results are so unexpected that if published by a less trustworthy author they might be questioned.

42, **43**. Farquharson, Journ. Iron and St. Inst., 1882, I., p. 204: Proc. Inst. Nav. Architects, April, 1882. His results differ from those of Andrews in that the rusting of steel was greatly retarded while in Andrews' experiments it was very slightly hastened by contact with wrought-iron. In both the rusting of wrought-iron is hastened by contact with steel. Six plates of wrought-iron and six of steel were immersed in sea water in Portsmouth harbor, England, for six months, three of each being simply immersed, the remaining three being coupled together in pairs, each wrought-iron plate being coupled to one of steel.

44 to **47**. Averages deduced by B. H. Thwaite from several thousand results of Mallet, Calvert and others. Journ. Iron and St. Inst., 1880, II , p. 668.

The composition of Parker's and Andrews' steels is given in Table 47, § 164.

soft steel plates are thought to retain their scale more tenaciously than wrought-iron, which hastens their corrosion: if this be removed there is probably no important difference in the rates at which they corrode.

Individual peculiarities of the specimens experimented on, and slight differences in the conditions affect the rapidity corrosion to an astonishing degree; this necessitates extreme caution in drawing inferences from even direct comparative tests: accurate conclusions can only be drawn from the averages of many determinations. Moreover, the relative corrosion of two classes of iron under one set of conditions gives no safe indication as to what it will be under another set.

The chief ulterior sources of the oxidation of iron are atmospheric oxygen, free or dissolved in water, its own oxides (sometimes as in puddling and pig washing ulterior sources, sometimes as in Bessemerizing mere carriers of oxygen), and more rarely water.

Table 44 condenses the results obtained by several experimenters, as regards the rate of corrosion of various classes of iron under different conditions.

§ 161. INFLUENCE OF SURFACE EXPOSURE; PYROPHORISM.—Finely divided iron, *e. g.* that prepared by reducing precipitated ferric oxide by hydrogen, is said to be pyrophoric when quite cold; that made in Percy's laboratory, however, would only ignite when sensibly warm to the hand, and sometimes only when heated above 100° C. Dropped into hot air it burns brilliantly. In pure water from which air is excluded it is not oxidized at 21° C (70° F.) and it is said to begin to oxidize at 55° C. (131° F.).[a]

§ 162. INFLUENCE OF TEMPERATURE.—*Pure dry oxygen*, inert on compact iron at 21° C. (70° F.) is said to begin to oxidize it appreciably at or above 200° C. (392° F.): at redness they unite with vivid incandescence.

(TO BE CONTINUED.)

[a] Percy, Iron and Steel, p. 13.

This pyrophorism has been ascribed to the condensation of hydrogen employed for deoxidizing in the pores of the spongy iron, which, like spongy platinum, is thought to determine the union of this gas with atmospheric oxygen: nor is this disproved, as has been thought, by the fact that the mixture of spongy iron and ferrous oxide which is obtained by igniting ferrous oxalate in closed vessels, is also pyrophoric: for, if this be free from hydrogen, may not its pyrophorism be ascribed to the finely divided unstable ferrous oxide which it contains? The influence of surface exposure is perhaps illustrated by the fact that while finely divided iron ceases to be pyrophoric if previous to exposure to the air it is heated beyond 427° C., yet if intimately and uniformly mixed with 3% of silica or alumina, which should protect its porosity, it is pyrophoric even if reduced at a red heat.

PERSONALS.

Mr. E. S. Spilsbury, mining engineer, of this city, has again gone to Europe on professional business.

Mr. John D. Frossard, mining engineer, of Montreal, Canada, is going to Santa Fe, New Mexico, on professional business.

It is stated that Rev. Dr. Francis L. Patton, Professor of Geology at Princeton College, Princeton, N. J., will succeed Dr. McCosh as president of the college.

Mr. S. B. Benson, of Pittsburg, is in the city for the purpose of introducing the coal-mining machine recently patented by John Hohn, a practical coal miner of Pittsburg.

Capt. Richard Trevarthen has resigned his position as mining superintendent of the Ropes Gold and Silver Mining Company, Michigan. Capt. Mose Williams will succeed him.

Dr. T. Sterry Hunt has gone to Kentucky to examine the coal and mineral properties of the Paducah Land, Coal and Iron Company, with a view to investments by Eastern parties.

Mr. Florence Marmet, a coal dealer, and President of the Raymond City Coal Company, W. Va., dropped dead on the 14th inst., in his office at Cincinnati, of apoplexy.

Col. J. W. Sloss has been advised by his physicians to retire from business matters, and the advice has been heeded. Colonel Sloss has been a great pioneer in the industrial development of Alabama.

Mr. L. E. Dunham, who until recently held the position of chemist to the Midland Blast-Furnace Company, has established an analytical laboratory in Marquette, Mich., in partnership with Mr. W. M. Strong.

Mr. W. S. Thomas, mining engineer, of Philadelphia, is in the city, stopping at the Hoffman. He has just returned from an extensive visit to the iron and coal fields of western Kentucky, and speaks in glowing terms of the future of this country.

Mr. George F. Kunz has written for *Harper's Magazine* for Christmas an article on the precious stones in the United States. It will be handsomely illustrated with a full-page plate of gems, printed in colors, giving in delicate tints fac-similes of the most beautiful and brilliant precious stones found in this country, and a number of original plates in black and white.

Dr. John M. Bailey, of the Virginia, North Carolina, and Tennessee Steel and Iron Company, has returned to Bristol, Tenn. Dr. Bailey has spent the past several years in pushing the industrial development of the country about Bristol, and, as an eyewitness and business man, he contributes to this number of THE ENGINEERING AND MINING JOURNAL a sketch of that region.

Mr. Young E. Allison, of Louisville, who contributes to this number a very graphic article upon the resources and future of Kentucky, is by profession a journalist and one too of very high standing in the South. He has given much attention to the development of his native State, and writing from the standpoint of personal observation, his article carries with it special interest.

Captain Green and two miners fell from the top of the shaft house in the Anvil Mine at Bessemer, Mich., to the bottom of the shaft on the 16th inst. The two miners were instantly killed, and Captain Green is not expected to recover. We trust that this worthy and efficient miner will yet recover from his sad accident, of which we have heard with great regret. Mr. Green has been connected with this mine since explorations commenced on it.

Mr. Joseph Curtis Platt, one of the oldest and best-known citizens of Scranton, Pa., died at his residence there on the 15th inst. Mr. Platt was born in Saybrook, Conn., in 1816. He removed from New Haven to what is now Scranton in March, 1846, and was one of the firm of Scranton & Platt, whose success in the iron business gave the start to the present city. This firm afterwards became the Lackawanna Iron and Steel Company, in which Mr. Platt remained a director up to the time of his death.

Mr. Paul Casamajor, a well-known chemist, died suddenly on the 12th inst., aged fifty-six years. When quite a young boy he came to New York with his father, one of the best-known residents of Cuba. He pursued his study at Portsmouth, N. H., and afterward went to Harvard College. He went to Paris and studied at the Ecole des Beaux Arts for a period of four year. He again visited America, and became interested in the oil regions, where he made a fortune. He then took up a thorough course of studies in chemistry, his specialty being sugar. He introduced the oil of wintergreen as an effective salicylate with good results in rheumatic affections. The latest work of the deceased chemist related to quinine compounds, and although he secured patents to protect his interests, he was still engaged in experimenting in this line. He was the corresponding secretary of the American Chemical Society, and, as such, corresponded with a great number of the leading chemists of the world.

FURNACE, MILL, AND FACTORY.

The Technical Chemical Company has been organized at Newark, N. J., with a capital stock of $25,000, by Otto P. Amend, Robert F. Amend, Ferdinand R. Minrath, and H. I. Jarrett.

A boiler in the Belleville steel-works in Paterson, N. J., exploded on the 15th inst. Two men were badly shaken up but not dangerously hurt. The building caught fire and a loss of $15,000 resulted.

In one week recently No. 1 Furnace, of the Crane Iron Company, at Catasauqua, Pa., produced 618 tons of merchant iron, beating its best record, while the four furnaces of this company made over 1700 tons the same week.

The Western Fuse and Explosive Company has been organized at San Francisco, Cal., with a capital stock of $50,000, by Alvinza Hayward, San Mateo; Egbert Judson, West Berkley; Ed. G. Lukens, and L. L. Bromwell, Oakland, and Gustav Sutro, San Francisco.

The Aurora Boiler Fluid Company, of Corning, N. Y., are meeting with great success in introducing their compound for removing scale from boilers. Many well-known firms that have tested it recommend it as being one of the best things in the market for the purpose.

One of the boilers in Heller Bros.' file-works at Newark, N. J., exploded on the 15th inst., killing one man and injuring three others. Fire followed the explosion and destroyed the building, causing a loss of $50,000. The boiler had recently been inspected and pronounced sound.

The Antrim Iron Company, at Mancelona, Mich., has its second stack nearly completed and will blow it in early in December. It is 48 feet high by 10 feet boshes and will have a capacity of 400 tons per week. It is the intention to blow but one stack at a time, holding the other in reserve.

The Edison Gauge Company, of this city, have recently supplied their recording steam gauges, which are now considered the standard, to the new City Hall buildings in Philadelphia; the Potter-Palmer House, Chicago; Durham water-works, North Carolina; Texakanna water-works, Texas.

The Oliver Iron and Steel Company, of Pittsburg, Pa., has been incorporated by Henry W. Oliver, Jr., David B. Oliver, James B. Oliver, John Phillips and John Smith, with a capital stock of $1,500,000. It is a consolidation of the present Oliver Brothers & Phillips' concerns with a limited liability.

The packing-house for dynamite of the Hancock Chemical-Works, Hancock, Mich., was blown up on the 16th inst., killing six men. The company carried 1500 pounds of dynamite. There is not a trace of the men or the building left. The explosion was felt plainly in Hancock and Houghton, several miles distant.

The factory of the Union Powder Company, located seven miles northwest of El Paso, Tex., was blown to atoms on the 16th inst. A man named Gulick was mixing about thirty pounds of powder outside of the building when it exploded, igniting fifteen hundred pounds of powder inside the building. S. S. Carter, of New York City, president of the company, was in the factory and was killed. Gulick was fatally injured.

Mr. James Morrow, Chief Engineer of the New York City Roller Flour Mill, New York, has used the Seldon Patent Packing (rubber core), manufactured by Randolph Brandt, of this city, for the past ten years. He writes that it has given entire satisfaction; he has used it on a Corliss engine 30×72 for the past six years and the piston rod and valve stems show but little signs of wear, which speaks well for the packing.

The demand for the Clayton air compressors, manufactured by the Clayton Air Compressor Works, of this city, is constantly increasing, and during the past month the sales average one air compressor per day, included in which are two No. 4 Duplex air compressors of the latest improved pattern for Anderson and Barr, to be used in sinking the caissons for the piers of the new bridge at Cairo, Ill.

The Frisbee-Lucop Mill Company, of this city, is doing a large business, and has recently sold mills to be erected in Montana, Idaho, Pennsylvania, New York, Mexico and the United States of Colombia. The company has now in operation in various parts of the country upward of 40 mills on phosphate rock alone, besides others on quartz, carbon, cement and various ores, and has had a marked success in pulverizing such materials as talc, mica, spiegeleisen, and cement clinker.

A charter has been granted to the Kansas City and Sabine Pass Coal and Iron Company, the principal place of which will be at Kansas City, Kan. The company has a capital stock of $5,000,000, and is now building extensive iron and steel works in Kansas City, and will soon begin the erection of other similar plants. The incorporators and directors are William Anderson and Daniel L. Haynes, of Kansas City, Mo.; Edward L. Sperry, Charles Wilson and Charles Van Horn, of Kansas City, Kan., and Harrison M. James and Fred M. Dey, of New York City.

The Cold Spring Furnace, at Cold Spring, N. Y., which has been operated under lease by the Hudson River Ore and Iron Company, and which has been in blast since December 29th, 1886, was blown out on the 5th inst., during that period, a little over ten months, the furnace produced 11,830 gross tons of pig-iron, made from all roasted Hudson River carbonate ore. The lease expires in November. Mr. F. E. Platt, the superintendent, says, "we gave up the furnace, having solved the question of being able to make excellent foundry iron from our ore used alone."

The Fowler Rolling Mill Company, of Chicago, claim an unprecedented production for their rolling mill in the 12 months ending October 31st. They have but one train of rolls, 9 inches in diameter, and only 12 feet long, with which they manufacture railroad spikes direct from old rails in six passes. Running single turn only this mill made 54,200 kegs of spikes, weighing 200 pounds to the keg, or an aggregate of 5420 net tons. It will be observed that this is a finished product, in which there is no scrap nor waste of any kind, which therefore makes the production still more significant. This train requires only three men to operate it.

Ella Furnace, at West Middlesex, Pa., operated under lease by the Wheeler Furnace Company, of Sharon, Pa., made the exeraordinary output in October of 3477 tons of Bessemer iron, or an average of over 112 tons per day. The last week of the month turned out a little over 852 tons, or an average of over 121 tons a day. This is considered remarkable from the fact that the furnace was built with a capacity of but 90 tons per day. In connection with the output of the Ella Furnace, noticed above, it is interesting to note that Mabel Furnace, at Sharpsville, which is operated by Perkins & Co., Limited, made the remarkably large output last month of 3101 tons of foundry iron, an average of 100 tons per day for 31 days. This, it is claimed, has no precedent in the blast furnace in the history of the Shenango Valley. The furnace is only 65 by 14 feet, and uses a 72-inch blowing engine.

We had prepared for insertion in this issue of the JOURNAL an illustrated article upon the subject of the Leather Link Belting, now being extensively introduced to our manufacturers by Messrs. Chas. A. Schieren & Co., of this city. It has, however, been crowded out by excess of other important matter, and will therefore not appear until next week. It need hardly be said that until very recently there was a considerable prejudice against this kind of belt, caused by the fact that in most cases where it had been tried it was found unsuitable to our swift motion machinery. The success with which it was generally adopted in England, especially in Glasgow, Scotland, however, induced many American brains to study out improvements, and during the past two years these efforts have been so successful that the leather link belts are now being freely adopted, are giving great satisfaction.

The Consolidated Electric Company, or, what is practically the same thing, the Sawyer-Man Electric Company, and the Thomson-Houston Electric Company, which is known under the name of the East River Light and Power Company, and the Westinghouse Electric Company, of Pittsburg, have formed a combination. The arrangement with the Thomson-Houston Company involves a license to that corporation to manufacture the Sawyer-Man burner in consideration of a royalty, and a general understanding to work for each other's interests. The Westinghouse Company loses its individuality, according to its arrangements; its interest and that of the Sawyer-Man Company will hereafter be one under the name of the Consolidated Electric Company. The Westinghouse Company has heretofore contested with its single larger competitor, the Edison Company, many a law suit instituted by the Sawyer-Man people for breach of patent. By the coalition of these two interests a powerful corporation is established.

CONTRACTING NOTES.

Contracts open will be found on page xix. New contracts this week: No. 629, Water-Works; No. 630, Wrought-Iron Bridge; No. 631, Water-Works and Sewerage System; No. 632, Water-Works; No. 633, Water-Works; No. 634, Bridge; No. 635, Water-Works; No. 636, Iron Bridges; No. 637, Water-Works and Electric Lighting System; No. 638, Boring Artesian Well; No. 639, Boring Artesian Well; No. 640, Water-Works.

The Aqueduct Commissioners of New York have received the following bids for a gate house, chambers, and blow-offs at Pocantico and Yonkers. No awards were made. The biddars for the work at Pocantico were Brown, Howard & Co., $24,719; Thomas Dobbin, $23,912; John Pierce, $22,410. The bidders for the work at Yonkers were O'Brien & Clark, $20,935; John Pierce, $22,160; Thomas Dobbin, $22,836.

The Commisioner of City Works, Chicago, Ill., has received the following bids for a tunnel four miles long under the bed of Lake Michigan: E. Earnsbaw, $823,161; Angus & Robinson, $1,145,175; A. Onderdonk, of New York, $748,500; McAdams & Amberg, $1,107,160; Fitzsimons & Connell, $887,490; M. P. Garrity, $800,628.17. Mr. Onderdonk will receive the contract.

LABOR AND WAGES.

The excitement at Pocahontas, Va., brought about by an expected riot on the 12th inst., between the Hungarian and negro miners has subsided. The trouble among the miners is said to have been caused by the classification in the mines, the negroes claiming that they should be put on the same footing with the Hungarians, and should receive as much wages.

At a meeting of the operators and miners held at Murphysboro, Ill., on the 12th inst., all differences were removed and the Columbus scale rates for May established, on a basis of nine hours' work in proportion to the prices for ten hours' work given by the Consolidated Coal Company. The blasters were already getting $2.25 for nine hours' work, which was in pro-

portion to $2.50 for ten hours. The Gartside mines, Harrison, the Carterville, and Fredonia mines will all pay in proportion to the Mount Carbon settlement.

The strike in the Lehigh coal region, Pa., still continues. The Stout Coal Company, of Milnesville, Pa., on the 14th inst. demanded the eviction of a number of the strikers from their houses. The company says that if the men will not work they must vacate the houses for men who are willing to work. It is understood that nearly all the companies of the Lehigh region will carry out this programme if necessary. The Knights of Labor have obtained a temporary injunction from the court restraining the sheriff from serving writs of ejectment upon the striking miners in the Lehigh Valley region. The injunction continues until the 21st inst.

The coal miners of the United States, 250,000 in number, are divided into two National orders, the Federated Association of Miners and Mine Laborers and District Assembly 135, Knights of Labor. An unfriendly rivalry exists between the two. They have a numerous and devoted membership and now, after repeated attempts to bring about a union, the executive boards of the two met at Columbus, O., on November 16th, to outline a plan of action. They decided to have another meeting, to take place on the day prior to the meeting of miners and operators called at Pittsburg on the second Tuesday in February next. This is the meeting at which the scale for the future season will be fixed. The object of the meeting was practically defeated, since the representatives of the organizations were not willing to lose their identity. If a new order is created the Knights of Labor will lose 35,000 members in the Assembly.

The joint board of arbitration and conciliation of the National Federation of Miners and Mine-Owners held an important meeting at Columbus, Ohio, on the 14th inst., there being present representatives of the coal operators from different States, The meeting was called pursuant to an agreement made at the meeting last spring, when the advance of five cents to the scale paid in the four States was made. It was settled at that time that the additional advance of five cents should be made at this meeting if a unanimity of opinion could be secured. The troubles in Illinois were discussed at considerable length. A resolution was reported reciting the existing troubles, speaking of the partial adjustment of the trouble in Illinois, and providing that the 5 cent advance should be paid to date from November 1st, 1887, until May 1st, 1888. This makes the rate of mining in the Hocking Valley 70 cents, in the Pittsburg District 79 cents. It is stated that all the operators in the Pittsburg field will grant the advance of five cents for digging agreed upon by the Joint Board of Arbitration and Concilation of the National Federation of Miners and Mine Operators, at Columbus. A meeting is to be held in Pittsburg in February next.

GENERAL MINING NEWS.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including November 9th, as reported by the Marquette *Mining Journal*, were as follows :

	Tons. 1887.	Tons. 1886.
Marquette, Marquette District	784,593	817,428
St. Ignace, " "	88,795	71,020
Escanaba, " "	832,248	618,522
" Menominee District	1,084,378	828,531
Ashland, Gogebic District	1.021,742	698,488
Two Harbors, Minnesota Iron Company, Vermillion District	380,196	300,954
Total tons	4.191,952	3,334,943

SHIPMENTS OF IRON ORE, GOGEBIC DISTRICT.—Shipments of iron ore from Ashland, Wis., the mines of the Gogebic District, for the season, up to and including November 9th, are as follows :

	Tons.		Tons.
Atlantic	2,637	Nimikon	21,820
Anvil	6,676	Norrie	164,192
Ashland	151,699	Odanah	20,071
Aurora	110,759	Pabst	8,947
Bessemer	12,790	Palms	1,414
Blue Jacket	1,350	Pence	1,457
Bonnie	1,004	Puritan	26,212
Brotherton	21,723	Sunday Lake	12,977
Colby North	65,678	Superior	22,625
Colby South	146,115	Sellwood	2,374
First National	984	Vaughn	2,101
Germania	44,890	Trimble	15,366
Iron Chief	2,250	South 15	4,995
Iron King	46,744	Parker	578
Ironton	26 160		
Kakagon	48,320	Total tons	1,021,742
Montreal	28,594		

The shipment shows an increase of 323,254 tons this year, as compared with the shipments made at the same time last year.

ARIZONA.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—The company has shipped about 50 tons of high grade matte for treatment at New York. The Clifton *Clarion* states : This matte will run 75 per cent copper and from 20 to 25 per cent sulphur, and is eagerly sought after by the refiners. The second or low-grade matte is treated here by the company, being subjected to the roasting process and then put through the furnaces again.

PIMA COUNTY.

An agreement has been made by Tucson parties with R. H. Paul to transfer his smelting plant now at Columbia Copper Camp, to a site at or near Tucson, and there erect the same, and put it into operation as a custom smelter.

YAVAPAI COUNTY.

Press dispatches report that the ore of the recently discovered gold mine ten miles from Prescott, on the Hassayampa River, averages $1000 per ton. This strike has created a great excitement in this vicinity. Later reports state that the strike was made on the side of a hill 200 feet above the level of the creek. The product of the mine thus far is declared to be the richest ever known on the coast. The ledge is 20 inches wide and runs north and south, and can be traced for nearly two miles.

ARKANSAS.

MONTGOMERY COUNTY.

PHŒNIX GOLD AND SILVER MINING COMPANY.—A correspondent informs us that the Bartlett smelter and office furniture of this company were sold at sheriff's sale on the 5th inst. to satisfy judgments against the company. The directors have since met, put up their money, and will push things ahead. They will erect the smelter, and expect to push work on the mines.

CALIFORNIA.

CALAVERAS COUNTY.

ORPHEUM GOLD MINING COMPANY.—This company has been organized with a capital stock of $100,000, to develop the mines known as the Orpheum group. The directors are : Gustav Walter, J. W. Pew, W. R. Craig, F. A. Berlin, and J. H. Roberts.

KERN COUNTY.

Mr. S. Bonshey is working his antimony mine at San Emigdio, and is now refining at the rate of about 400 pounds per day, and expects to more than double the amount in a very short time. The antimony which he is putting on the market is pronounced by experts to be of a superior quality. The ore, as taken from the mine, it is stated, yields about 40 per cent of refined metal, and lies so near the surface of the ground that the cost of working is comparatively light.

MONO COUNUY.

DUDLEY.—Work has been resumed in this mine at Bodie after a long shut-down.

STANDARD CONSOLIDATED GOLD MINING COMPANY.—The product for the first two weeks of November amounted to $20,238, an increase of nearly $4000 over that for the same time in October.

NEVADA COUNTY.

BRUNSWICK GOLD MINING COMPANY.—The company is doing good work and every thing is in substantial order at the mines. The hoisting-works is a structure worthy of the prospect in view, and the three-compartment shaft is a model in itself.

PLUMAS COUNTY.

GREEN MOUNTAIN GOLD MINING COMPANY.—The mine has been closed down for the want of water. The workingmen had taken charge of the property, as already mentioned in our issue of the 5th inst., to work it for the purpose of securing if possible some of the wages due them. They ran 30 stamps nineteen days, and cleaned up $3500. This is better pay than the mine had produced for a long time, and it stated that with the proper amount of funds for development work, good results would be obtained. There has been no money to do development work with. The tunnel has been driven nearly a mile into the mountain without any cross-cutting to speak of being done.

TRINITY COUNTY.

A tunnel through a solid ledge, about six miles below Big Bar, is now under way. It is on the same plan as the one of the Big Bend Tunnel and Mining Company on Feather River, Big Bend, Butte County. This tunnel is to be about 400 feet long and 12 by 8 feet inside timbers, to drain about two miles of the Trinity River in summer time. The tunnel will be completed about February 1st, 1888. The tunnel is abreast of Big French Creek. It is said that the French Bank of San Francisco is at the head of the enterprise.

CENTRAL AMERICA.

HONDURAS.

ZELAYA MINING COMPANY.—Work at the company's property at Guadalupe is being pushed vigorously, and it is stated that large bodies of rich gold ore have been uncovered at the Colonia mine, one of the mines owned by the company. A large amount of rich ore is in sight, and every thing is ready for a large milling plant, to be erected shortly.

COLORADO.

An effect of the completion of the Denver & Rio Grande Railroad to Aspen has been the bringing of large quantities of ore to Leadville, and the smelters there are said to be having a boom.

COLORADO COAL AND IRON COMPANY.—The company has begun the erection of its coke-ovens at Carbondale, which is now said to be the most prosperous station between Leadville and Aspen.

ARAPAHOE COUNTY.

BOSTON AND COLORADO SMELTING COMPANY.—The company is running six furnaces on copper ore. By recent improvements in the construction of the reverberatory furnaces at the works, the capacity has been increased, and the average amount of ore now treated per furnace every 24 hours has been brought up to 25 tons. Concerning the probable branching out of the Argo establishment so as to embrace argentiferous lead ore smelting, Senator Hill stated that the company had decided upon enlarging. Every thing is now in readiness for the necessary addition, and it is likely that the construction of water jacket furnaces will be begun at an early day.

LAKE COUNTY.

We condense the following from the Leadville *Herald-Democrat :*

A. Y. & MINNIE.—Some interesting developments have recently been made in this mine. The Minnie shaft, after passing through the first contact, went into porphyry, and having been sunk through this a distance of 75 feet, has struck sulphide ore again, at a depth of about 400 feet. The limestone at this place has evidently been split by a tongue of intrusive porphyry, entirely replaced by ore above it, and a zone of mineral deposited underneath. As the Colonel Sellers, Moyer, and mines to the east of the Minnie have no working to this depth, nothing definite about the lower ore body can be stated.

Development and prospecting work still continues, however, proving and opening extensions of the main shoot in various directions. There are now, each month, 4000 tons of ore hoisted, and hereafter the gross amount of ore will be 5000 tons per month. The underground workings of the mine are all planned to drain to one point, the sump of the pump shaft through which it is raised to the surface.

The additions to the mill are about completed. The capacity is 100 tons per day. Three new four-compartment jigs have been built, and, with the Hooper slimer, will make the washing machinery in the mill eight jigs and two Frue vanners. The mill is now dressing but 70 tons per day, but as the crushing capacity was sufficient for 100 tons, the number of jigs and tables was increased in proportion. The mill is now doing very satisfactory work. The average work of last month showed 83 per cent of the lead value in the ore saved and 50 per cent of the silver.

IRVING MINING COMPANY.—The owners of the Helena mine, in Iowa Gulch, have recently incorporated the above company. The capital stock is $1,000,000, shares of $10 each. The main shaft is down about 50 feet. The ore is sulphide, galena and pyrite with little zinc. The officers of the company are Mr. George E. Batchelder, President; Frank W. Hurd, Secretary; Irving Besley, Manager.

ROBERT E. LEE MINING COMPANY.—The annual meeting of this company was recently held at Leadville. The following officers were elected : F. G. White, President ; L. D. Roudebush, Vice-President ; E. A. Guilbault, Secretary ; Albert Sherwin, Treasurer ; Clinton Roudebush, General Manager.

ST. KEVIN MINING COMPANY.—Men working in this mine report a new and important strike in the lower levels of the mine. In one of the drifts a breast of three feet of rich ore has been disclosed. The mill has started up for work.

SAN MIGUEL COUNTY.

NELLIE GOLD MINING COMPANY.—This property will be sold by the trustees of the bondholders at Telluride, on December 17th, owing to the non-payment of interest on the bonds issued by the company.

SILVER BELLE.—This mine, at Ophir, has been sold to a syndicate of St. Louis capitalists. Active preparations have been made for extensive working this winter and putting the mine in shape for a large ore production. The Silver Belle has been one of the most regular and best paying mines in San Juan for the past six years, although only worked in a limited manner. The ore is of a fine grade and a desirable smelting ore, running from 150 to 250 ounces in silver to the ton.

SUMMIT COUNTY.

JUMBO MINING AND MILLING COMPANY.—We are officially advised that this company, to which we referred to in our last issue, has recently purchased 160 acres of placer ground which is heavily timbered, there being over one million feet of lumber, in addition to mine timbers and wood for fuel; a saw mill and engine have been purchased and paid for by the company, they are now at work cutting lumber for the new mill. There is a supply of fuel on hand, all bought and paid for out of the net earnings of the company, sufficient to keep the present mill running until next spring. As already stated in our last issue dividends have been suspended for a short time to provide the funds for a new mill; this is recommended by every consideration of economy and good management.

CONNECTICUT.

FAIRFIELD COUNTY.

A company is about to be organized at Ridgefield, with a capital stock of $12,500, for the purpose of boring for oil.

DAKOTA.

CUSTER COUNTY.

TIN MOUNTAIN COMPANY.—H. W. Fowler, general manager of the Fowler Rolling Mill Company, of Chicago, has recently returned from the Black Hills, to which he had gone for the purpose of arranging for the erection of a plant to develop the tin mines of this company, in which he and other Chicago capitalists are interested. A building is being erected near the mine, and steam power will be supplied sufficient to handle 50 tons of ore daily, but for the present it is intended to handle but 20 tons. Mr. Fowler hopes that concentrates will be shipped from the works some time this month. They will then be smelted in Chicago, and American tin will probably be put on the market as a commercial product in January at the latest. Mr. Fowler and his associates have pursued their investigations very quietly, and it is only during the past few weeks that he has made public what has been accomplished. His attention was called last spring to the great deposit of tin ore near Custer City, on what is called Tin Mountain, which, thus far, no one had been able to do any thing with on account of the diffi-

culty of separating the tin from the mica schist which accompanies it. After experimenting with a quantity of the ore, which was taken to Chicago for the purpose, Mr. Fowler found that he was able, by a method of his own, to concentrate the ore. The working plant, which was then gotten up to prepare the ore at the mine, consists of a Gates ore crusher, a cyclone pulverizer and Mr. Fowler's own separator. The cost of producing the pure tin is estimated at about 10 cents per pound. The president of the company is C. H. McCormick, of the McCormick Reaper Works; the vice-president is A. C. Bartlett, of Hibbard, Spencer, Bartlett & Co., while H. W. Fowler is secretary, treasurer and general manager.

LAWRENCE COUNTY.

Further reports from San Francisco in reference to the treatment of the ores of the Bald Mountain District, referred to in our issue of November 5th, states that experiments made by Mr. R. D. Clark were successful. Mr. Thomas Price made some tests, and states that, although his experiments have been conducted on a comparatively small scale, he is satisfied of their correctness, and that the results reported can be approximately duplicated when working on an economic scale. Roasting and chloridizing in a White & Howell furnace will place the ore in such a condition that leaching by means of hyposulphite of soda and the so-called "extra solution" will extract not less than 70 per cent of the gold and 80 per cent silver; while a further extraction of 8 per cent gold and 10 per cent silver will be effected by pan-amalgamation. This will make a total saving by the combined processes of 80 per cent of the gold contents and 90 per cent of the silver contents.

The Retriever and Buxton companies have determined to accept the offer made by proprietors of the Minneapolis, Minn., plant, for reducing ores by the Potter process, and will each at once ship thither, 500 pounds of ore for treatment. The Deadwood *Pioneer* says: Should the tests prove as successful as the reduction company thinks they will, a saving of almost all the gold and silver in the rock will result; and the Potter process will prove a formidable competitor for the leaching methods of Mr. R. D. Clark.

GALENA SMELTING AND REDUCTION COMPANY.—The smelter at Galena has closed down for an indefinite period. Local papers state that the reasons for this course is inability to run the works and reduce the ores of the mines in Bear Butte District, at the figures the reduction company has been receiving for the work, without entailing a loss to the company. It is thought that arrangements will be effected within the next few months by which the works can be again blown in and kept then in continuous operation.

IDAHO.

ALTURAS COUNTY.

CAMAS NO. 2.—The hoisting-works at this mine were destroyed by fire last week. The loss is in the neighborhood of $3000, which is partially covered by an insurance of $800.

CUSTER COUNTY.

CHARLES DICKENS MINING COMPANY.—The stoppage of work at this property is stated to be for the purpose of settling some business of the company. There are heavy (old) liens against the company. The plan has been worked to lift this indebtedness by issuing in lieu paid up stock to the holders, and this has been consummated. When this is completed operations will be resumed.

KENTUCKY.

HAWESVILLE & PELLVILLE MINERAL RAILWAY COMPANY.—This company has been organized at Hawesville, with D. L. Adair as president, and Robert Winn secretary. The road will run from Hawesville to Pellville, and thence to a connection with the C. & O. near Hartford, about 45 miles a long and inside the eastern edge of the Illinois coal-fields. The minerals along the route are being subscribed as stock, of which the company expects to control 150,000 to 200,000 acres, which will be mortgaged to secure the capital to build the road and develop the mines.

BELL COUNTY.

PINE MOUNTAIN LAND AND COAL COMPANY.—This company, which has a capital stock of $1,000,000, owns 700 acres of iron property in Pineville, and some 6000 acres of iron and coal land adjacent to Pineville. For further particulars we refer to the advertisement of this company published elsewhere.

MEXICO.

The contract made by the Minister of Finance with Messrs. F. Aspe and A. Labadie for the establishment of a stock exchange in the city of Mexico has received the approval of Congress. The following classes of operations can be effected on the exchange: 1. Purchase and sale of all kinds of securities issued by the Federal or State governments, or by city councils, or other public offices depending on government, provided such securities be negotiable according to law. 2. Purchase and sale of foreign securities. 3. Purchase and sale of letters of exchange, promissory notes, and, in general, of commercial paper of all kinds. 4. Purchase and sale of stock issued by private companies legally constituted. 5. Purchase and sale of metals, whether coined or in bullion. 6. Wholesale dealings in merchandise; and, 7. Making of insurance contracts for land and sea risks.

Doubts as to whether any given operation comes under the above-named classes shall be decided by the Treasury Department. A bulletin will be published in connection with the institution giving the figures at which operations have been effected, or if there have been none, the sums asked and offered by sellers and buyers respectively. The bulletin will also print important telegraphic dispatches relating to business both at home and abroad. For the term of fifty years, the government agrees that the quotations published in the bulletin shall be considered as the true market value of the securities to which they refer. For the same period of time, it is stipulated that the government shall not grant more liberal concessions to any other stock exchange, or if it grants such concessions, the Exchange, which Messrs. Aspe and Labadie are authorized to found, shall become *ipso facto* a participant in them. This clause resembles what in international treaties is termed the most favored nation clause. The Secretary of the Treasury will appoint an interventor, in whose presence and subject to whose approval the transactions occurring on the Exchange shall be entered in the books. He will also preside at the drawing up of the minutes on which the bulletin of the day will be formed. The Exchange will furnish half-yearly, in January and July, a general review of the proceedings of the foregoing six months. Four months are allowed for the formation of the statutes; six months after their approval by the Treasury Department, the Exchange is required to be in full operation.

MICHIGAN.

COPPER MINES.

CALUMET & HECLA MINING COMPANY.—A claim has been brought by J. H. Chandler, of Chicago, to forty acres of land in Michigan which constitutes some of the richest portions of this company's property. It is stated that the deed which Mr. Chandler holds was secured from the State and will not affect Calumet & Hecla, as they have a warranty deed from the St. Maries Ship Canal Company. Chandler's claims are under an old ruling of the government relative to State swamp lands.

IRON MINES.

ANVIL MINING COMPANY.—At a meeting of this company recently, held in Milwaukee, it was decided to bond the mine for $100,000. This will pay up all the indebtedness of the company and leave a large surplus with which to develop the property during the winter months. It is thought there will be no trouble whatever in placing the bonds. The Bessemer Consolidated Company has offered to purchase the stock, agreeing to pay therefor at the rate of $8 per share, exclusive of the debts, which the present stockholders must discharge. The president of the company was authorized to offer the stock for $8.50 per share.

TONTINE MINING COMPANY.—This property has been sold to satisfy the claims against the company, amounting to about $4500. The machinery and buildings sold for $2100, and the lease-hold or option for $2400 M. M. Riley, of the firm of Howell & Riley, bid the property in as trustee, and, it is said, for some of the largest stockholders in the mine. The Tontine is located between the Valley and Ironton, and is a good property. A new company will probably take hold of this property and proceed to develop it.

MINNESOTA.

DULUTH & IRON RANGE RAILROAD.—The new directors of this railroad, which is owned by the Minnesota Iron Company, are: H. H. Porter, Chicago; Marshall Field, Chicago; R. P. Flower, Benjamin Brewster, H. R. Bishop, D. O. Mills, H. M. Flagler, David Dows, New York; George H. Ball, Boston; P. H. Kelly and George C. Stone, St. Paul, and R. H. Lee and C. Tower, Jr., Duluth. Officers: H. H. Porter, Chairman; H. R. Bishop, President; R. H. Lee, Vice-President; C. W. Hilliard, Secretary and Treasurer. Five per cent stock to the amount of $3,500,000 was issued to take the place of $2,500,000 6 per cents retired. Twenty miles of new road have been added to the line. The general office of the company will be at Chicago.

MINNESOTA IRON COMPANY.—This company has been reorganized by the parties who recently purchased the controlling interest, referred to in our issue of July 9th. The capital stock has been raised from $10,000,000 to $14,000,000. The directors are: H. H. Porter, J. C. Morse, Marshall Field, H. R. Bishop, R. P. Flower, Benjamin Brewster, Henry Siebert, H. M. Flagler, D. O. Mills, C. Tower, Jr., P. H. Kelly, George C. Stone, Samuel P. Ely. Officers: Chairman, H. H. Porter; President, H. R. Bishop; Treasurer, A. J. Patterson; Assistant Treasurer and Secretary, C. P. Coffin, Chicago.

MONTANA.

BEAVERHEAD COUNTY.

TUSCARORA MINING AND SMELTING COMPANY.—The successful result attained by the company during the past sixty days with its present plant at Argenta, producing from two and a half to three tons of bullion daily, which nets the company over $200 per ton after defraying all transportation and refining charges, warrants the company to branch out on a larger scale, and with this purpose in view the company contemplates early in the spring the erection of a large furnace of same size and design as now in use by the Omaha & Grant Smelting Company.

The property of the company consists of the Tuscarora, Stapleton, and Silver Light (silver-lead mines), Iron Age (iron), limestone quarry and fire clay deposit, together with land surrounding the works, valuable for townsite and building purposes.

At a recent meeting of the company the trustees decided to arrange for additional reduction works immediately, and have placed fifty thousand shares of the treasury stock on the market to be sold at the rate of 50 cents per share.

DEER LODGE COUNTY.

SYDNEY CONSOLIDATED MINING COMPANY.—This company has temporarily suspended operations.

JEFFERSON COUNTY.

HELENA MINING AND REDUCTION COMPANY.—The production for October was nearly $190,000. The company has not yet resumed buying custom ores indiscriminately, confining themselves to small lots, principally offered by prospectors who are in need of a home market and quick returns.

LEWIS & CLARKE COUNTY.

STERLING MINING COMPANY, LIMITED.—The output of this property during the last twenty days of October, during which the ten-stamp mill ran, was nearly $5000. About $18.50 per ton is saved from the ore. The monthly output pays all expenses of mining, milling and development and leaves something as a margin.

WINSCOTT MINING COMPANY.—The Winscott mine, situated four miles south of Helena, has been closed down. It is stated that Mr. Towner, the president, who is now in Kansas City, had failed to provide money to carry on the work, and, rather than incur liabilities operations were suspended. The unpaid liabilities amount to $3000 or $4000, which are amply secured by the unencumbered surface property. The company was organized a few months ago and is regarded as an excellent gold property. A ten-stamp mill was ordered, but has not yet been shipped, though the building to receive it is nearly ready. The mine is in excellent shape.

SILVER BOW COUNTY.

The Wakeup Jim, Mountain Consolidated, and other mines known as the Chamber Syndicate, which were closed down a short time ago, have again resumed operations.

NEVADA.

STOREY COUNTY—COMSTOCK LODE.

We condense the following from the Virginia City *Chronicle*:

ALTA MINING COMPANY.—The 10-stamp mill is crushing daily about 35 tons of ore above the "milling" grade. Ore extraction is in progress at several points on the levels above the 1050.

CHOLLAR MINING COMPANY.—The new mill was to start up last week. The pan capacity of the mill is for 60 stamps, and the entire structure was built of a size to admit of the addition of 20 more stamps when required. Under the Logan process of amalgamation adopted, it was necessary to put in five separate lines of pipe in the pan room. The retort room is one of the most complete in its appointments of any yet constructed on the Comstock. There are three separate furnaces, each provided with a steel retort with a capacity equal to the requirements of an 80-stamp mill.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—During the week ended the 5th inst, 1016 tons of ore were shipped to the Morgan mill and 730 tons to the Eureka mill, and 705 tons to the California mill. The average assay value of all the ore worked at the above mills during the week, according to battery samples, was $28.90. The California mill has begun dropping its eighty stamps. The total bullion product from the mine for the past month was $227,517.67.

CROWN POINT MINING COMPANY.—Daily shipments of 40 tons of ore are made from this mine to the Vivian mill. This ore is what is extracted in explorations on the 400. A heavy flow of water is coming in the face of the south drift on that level, which is now in Belcher ground.

HALE & NORCROSS MINING COMPANY.—Ore is being extracted from the 700 level north drift. The south boundary line, west cross-cut, on that level, has exposed a breadth of 25 feet of low-grade quartz mixed with clay. Low-grade quartz carrying streaks of ore is showing in a south drift from the 1350 level east cross-cut, started from the 1300 winze bottom.

LADY WASHINGTON MINING COMPANY.—Negotiations are pending for the lease of a mill to crush ore from the extensive development made on the 725 level.

SAVAGE MINING COMPANY.—Ore extraction is progress from the stopes opened above the 600 and 700 levels. A breadth of four feet of high-grade ore is developed in the 750 north drift, and stopes will be opened on that level immediately. Samples of this ore show an assay value of $200 per ton. Mr. H. M. Levy, president of the company, is reported to have said that the ore development is of sufficient importance to warrant the statement that it will place the mine on a dividend-paying basis long before the area now exposed is exhausted.

SIERRA NEVADA MINING COMPANY.—The old rumor, current at intervals since 1870, that the management has decided to cut the ground up into four separate mines, to be known as the Mackay, Meredith, Skae, and Sierra Nevada, has been revived. The Sierra Nevada has a total length of 3300 feet, north and south, along the lode. This would give each of the four mines a length of 825 feet of ground. If this project is adopted the holders of the Sierra Nevada stock will receive a stock dividend of four shares of the stock issued by the proposed new incorporations for one of the old Sierra Nevada.

NEW YORK.

ORANGE COUNTY.

Granite has been discovered in Mount Adam, town of Warwick. The granite takes on a high polish, is suitable for monumental work, and will compete with

the product of the Quincy quarries. It quarries nicely in from one to eight feet seams. Parties have purchased sixty-five acres of the land in which these quarries are located.

NORTH CAROLINA.

CLEVELAND COUNTY.

Messrs. Parrott & Armstrong have recently developed large beds of Bessemer iron ores near King's Mountain station, on the Atlanta & Charlotte Railroad. The ores are said to contain from 46 to 65 per cent metallic iron and are exceedingly low in phosphorus, sulphur, and other impurities. The various veins show from 3 to 14 feet in thickness at intervals for a distance of about four miles.

PENNSYLVANIA.

WASHINGTON MINING AND IMPROVEMENT COMPANY.—This company has been organized in Pittsburg, with a capital stock of $50,000, to bore for oil and natural gas. Their first operations will be in the Washington fields.

COAL.

Fire destroyed the No. 6 breaker of G. H. Myers & Co., at Yorktown, on the 14th inst. The boiler-house, drying-house and several other large outbuildings were also burned. The loss is $30,000.

EXETER.—This colliery, at Pittston, is reported to have resumed operations after three years' idleness.

SUSQUEHANNA COAL COMPANY.—The hearing at Wilkes-Barre in the mandamus to compel the officers of this company to produce the bodies of the miners entombed at Slope No. 1, at Nanticoke, on December 18th, 1885, has been postponed until the 21st inst. The court has notified the company that they will be required to show cause why the request of the petitioners shall not be granted.

NATURAL GAS.

BADEN NATURAL GAS COMPANY.—An application was made in the county courts at Pittsburg, on the 17th inst., for the appointment of a receiver to take charge of and wind up the affairs of the Baden Natural Gas Company. The bill alleges, among other things, that the company is insolvent and that the affairs of the company are being run in an unsatisfactory manner. The indebtedness of the company is $100,000. The court made a preliminary order restraining the transfer or assignment of any of the assets of the company, pending a hearing on the 19th inst. The capital stock of the company is $500,000, its bonds $200,000, and floating debt $104,000. The assets are 31 miles of pipe lines and 3000 acres of gas territory in Beaver County.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to November 12th:

	1887. Gallons	1886. Gallons.
From Boston	3,636,390	5,130,682
Philadelphia	144,564,838	132,257,683
Baltimore	6,897,741	13,778,216
Perth Amboy	14,462,129	5,250,603
New York	325,640,606	343,421,516
Total exports	495,201,713	499,858,700

UTAH.

BEAVER COUNTY.

HORN SILVER MINING COMPANY.—According to the Salt Lake *Tribune*, this mine is shipping twenty cars of ore a week now, and selling it; no sign of resumption of operations at its smelters is visible, and it is by no means certain that this much ore is being shipped.

WASHINGTON COUNTY.

CHRISTY MINING COMPANY.—Superintendent Gillespie is reported to have said, in regard to the working of the Rae electric system in the Christy mill, that notwithstanding that the dynamos were in bad condition on account of rough usage upon the road, and did not do well the first two weeks of the run, the bullion saving has averaged 57 cents per ton since they started. This alone shows a gain of $1026 per month, the mill working 1800 tons of ore. Former average loss of quicksilver was one pound to each ton of ore worked. He could not give the exact figures of the saving in quicksilver, but places it above 50 per cent, or one half pound to the ton, a net saving of at least 900 pounds of quicksilver per month.

WEST VIRGINIA.

MASON COUNTY.

TIN AND ORE MINING, SMELTING, AND MANUFACTURING COMPANY.—This company is putting up a large building to cover a double reverberatory furnace, engine, crusher, and pulverizer, at Glenwood. The company is also sinking a shaft for extraction of tin stone. The company has about 20,000 acres mineral land.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 18.

Statistics.

Production of Coke on line of Pennsylvania RR. for week ended November 12th, and year from January 1st.

Tons of 2000 pounds.

	1887. Week.	1887. Year.	1886. Year.
Tyrone & Clearfield	....	1,770	....
Allegheny Region	5,178	217,042	164,286
West Penn. RR.	1,935	96,583	94,569
Southwest Penn. RR.	58,076	1,439,029	2,372,274
Penn. & W. Region	11,930	307,900	285,215
Monongahela	2,800	105,041	123,346
Pittsburg Region	....	38	95
Snow-Shoe	1,521	46,642	24,055
Total	81,440	2,214,025	3,018,840

Production Anthracite Coal for week ended November 12th, and year from January 1st:

TONS OF 2240 LBS.	1887. Week.	1887. Year.	1886. Year.
P. & Read. RR. Co.	167,930	6,475,895	9,980,900
Cent. R. R. of N. J.	93,496	4,218,270	*
L. V. RR. Co.	103,704	5,246,195	5,278,199
D., L. & W. RR. Co.	161,900	5,099,239	*4,401,410
D. & H. Canal Co.	100,960	3,385,616	*3,061,458
Penna. RR.	61,032	3,203,792	2,981,169
Penna. Coal Co.	42,186	1,356,496	1,211,702
Penna. Canal Co.	17,361	448,721	447,655
N. Y., L. E. & W. RR.	....	†628,935	595,507
Total	748,569	30,063,159	27,958,000
Increase	....	2,105,159	....
Decrease	30,004	....	....

* Included in tonnage of Philadelphia & Reading RR.
† Tonnage to November 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1882.....25,770,651	1884.....26,914,936
1883.....28,060,808	1885.....26,821,019

Production Bituminous Coal for week ended November 12th, and year from January 1st:
Tons of 2000 pounds, unless otherwise designated.

EASTERN AND NORTHERN SHIPMENTS.

	1887. Week.	1887. Year.	1886. Year.
Phila. & Erie RR.	221	18,877	11,135
Cumberland, Md.	78,367	2,792,522	2,166,353
Barclay, Pa.	3,976	157,141	160,393
Broad Top, Pa.			
H. & Broad Top RR.	†8,000	294,917	330,370
Clearfield Region, Pa.			
Snow Shoe	2,891	143,538	94,122
Karthaus (Keating)	4,505	164,840	123,037
Tyrone & Clearfield	67,103	2,737,870	1,894,764
Tipton	182	14,085	....
Alleghany Region, Pa.			
Gallitzin & Mountain	14,863	808,471	588,203
Pocahontas Flat Top Coal.			
Norf'k & West. RR.	24,458	977,106	742,953
Kanawha Region, W. Va.			
Ches. & Ohio RR.	†35,000	1,403,416	1,096,008
Total	239,586	9,509,883	7,201,338

* Tons of 2240 lbs.
† Estimated.

WESTERN SHIPMENTS.

Pittsburg Region, Pa.			
West Penn RR.	7,174	259,827	277,705
Southwest Penn. RR.	2,814	101,360	138,177
Pennsylvania RR.	6,271	178,847	241,168
Westmoreland Region. Pa.			
Pennsylvania RR.	39,969	1,369,716	1,076,704
Monongahela Region. Pa.			
Pennsylvania RR.	10,140	366,596	352,768
Total	66,368	2,276,346	2,086,602
Grand total	306,354	11,786,229	9,287,940

Anthracite.

The coal trade continues to boom with wonderful spirit, and while spot coal is actually scarce those who have it are likely to profit by the fact. Indeed we know of Lehigh coal having sold to-day f.o.b. at $5.50 per ton for Egg, $6 for Chestnut, and $5.75 for Stove. It is rare indeed to see such prices, and rarer to see chestnut size selling above stove. These may be called high tide for the present. More common figures are those which are quoted for free burning Wyoming Valley coals, as follows: Lump, $4; Broken, $4; Egg, $4.25; Stove and Chestnut, $4.75; Pea, $3.10; Buckwheat, $2.25. In quoting these prices the companies add: "We have nothing to sell."

Perhaps the following figures represent more nearly the actual transactions: Broken, $4@$4.15; Egg, $4.50@$4.75; Stove, $5.25@$5.50; Chestnut, $5@$5.50; Pea, $2.75@$3.10; Buckwheat; $2.25.

The Pennsylvania Coal Company quotes, in a circular dated November 15th, the following prices at Newburg, subject, of course, to the usual contractors' discount: Lump, $3.90; Broken, $4; Egg, $4.50; Stove, $5; Nut, $5; Pea, $3. Freight to New York is 20 cents.

While more non-union men are going to work in the Lehigh region, there is no indication of an early collapse of the strike. The concession by Hayden & Company at one of their collieries has undoubtedly added strength to the strike.

We commend to those who organized and are keeping up this senseless strike a study of Judge Elwell's exposition of the law, as quoted on another page.

The following official statistics show that, while our production of anthracite this year exceeds that in the corresponding period in 1886 by 2,139,373 tons, our stocks have declined from 440,962 tons to 158,976 tons, and stocks in second hands all over the country are unusually light, so that our actual consumption must have been fully 3½ million tons greater this year than in 1886.

The same remark can be made of bituminous coal consumption, and these are facts which demonstrate in an incontrovertible manner a very unusual degree of industrial prosperity as existing in every portion of the country.

Mr. John H. Jones, official accountant, has sent us the following statement of the anthracite coal tonnage for the month of October, 1887, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

COMPANIES.	October, 1887.	October, 1886.	Difference.
Phila. & Reading RR.	782,081	795,441	Dec. 13,359
Central RR. of N. J.	390,891	734,237	Dec. 143,345
Lehigh Valley RR.	328,602	666,243	Dec. 337,641
Del., Lack. & West. RR.	699,039	550,019	Inc. 149,019
Del. & Hud. Canal Co.	392,347	372,764	Inc. 19,582
Pennsylvania RR.	350,376	356,237	Dec. 5,860
Pennsylvania Coal Co.	177,538	166,110	Inc. 11,427
N. Y., L. E. & W. RR.	64,421	71,123	Dec. 6,702
Total	3,185,298	3,512,177	Dec. 326,878

COMPANIES.	For year. 1887.	For year. 1886.	Difference.
Phila. & Reading RR.	6,148,338	5,402,322	Inc. 746,016
Central RR. of N. J.	4,042,939	4,038,255	Inc. 4,684
Lehigh Valley RR.	5,030,277	4,960,203	Inc. 70,073
Del., Lack. & West. RR.	4,777,565	4,165,280	Inc. 612,285
Del. & Hud. Canal Co.	3,185,942	2,867,009	Inc. 318,932
Pennsylvania RR.	3,098,401	2,878,121	Inc. 220,280
Pennsylvania Coal Co.	1,274,347	1,140,675	Inc. 133,671
N. Y., L. E. & W. RR.	628,935	595,507	Inc. 33,428
Total	28,186,749	26,047,375	I. 2,139,373

The stock of coal on hand at tide-water shipping points, October 31st, 1887, was 158,976 tons; on September 30th, 1887, 394,748 tons; decrease, 235,772 tons.

Bituminous.

The cry is still lack of cars and urgency on the part of contractors asking for coal. Some of the coal companies are very hard pressed to keep their customers supplied, but with this branch of the trade relief for this market is expected by the winter closing of many markets which are now being stocked up. A good deal more coal than usual will have to go to market "all rail" this year.

The price here is still nominally $3.50, in reality spot coal can command $3.75. The Pocahontas Company is still sending a few thousand tons a week to this market on contract freights of about 80 cents per ton. Present rates of freight are $1 to $1.15, which would greatly interfere with this trade.

Boston. Nov. 17.

[From our Special Correspondent.]

Detention in loading coal has increased, and now three weeks is required for the delivery of an order on stove and egg sizes. Broken coal and the small sizes can be had with less detention, but the whole situation is a strained one, and the extreme figures are being paid for immediate delivery, say as high as $5.15@$5.25 f.o.b. in New York for Stove and $4.50@$4.75 for Egg. There is no nut coal of any account offering. Pea coal is more abundant, and orders can be filled with fair promptness at $2.75 f.o.b.

The supply of broken coal is also larger than that of most other sizes. As high as $4 f.o.b. at New York is freely paid, however, for prompt shipment. The operations of individuals and outside companies do not seem to crowd the market any, and it is claimed that there will be no large stock of coal at shipping ports before the middle of December.

There is a firmer tone to the bituminous coal prices, and quotation of $2.50 f.o.b. will have to be retired, temporarily, at least. No sales are reported under $2.60, and it is said that as high as $2.70 is obtained by some.

There is a strong tone to freight, which are higher than at any time this season. We quote exclusive of discharging: New York, 85@90c.; Philadelphia, $1.15@$1.25; Baltimore, $1.40@$1.50; Hampton Roads, $1.25@$1.30.

Retail trade is good, and prices firmly held: Stove, $6.25; Egg, $6; Furnace, $5.75; Nut, $6.25; Franklin, $7.50; Lehigh Egg, $6.25; Furnace, $6. Wharf prices are 50 cents less than the foregoing.

Pocket prices have been advanced in several instances, and are:

	Broken.	Egg.	Stove.	Nut.	Pea.
Hard White Ash	$5.40	$5.65	$5.90	$5.50	$3.85
Free " "	5.25	5.50	5.90	5.50	3.85
Lykens Valley	6.00	6.75	6.75	....	....

Buffalo. Nov. 17.

[From our Special Correspondent.]

The demand for hard and soft coal continues very brisk, but trade still hindered by lack of transportation facilities by rail and the short supply in chutes for vessels bound for upper lake ports.

Prices of coal strong, with no new features, although those alluded to last week are if any thing more prominent.

Reports are in circulation that a new coke producing syndicate in the Connellsville region is in progress of formation. No change is made public in local trade requirements or in prices.

"Where is all the coal gone to this year?" is the query which greets your ear. Can you tell? Increased population, active demand for all kinds of manufactures and more wealth among our people are some of the causes.

The *Courier* of November 12th publishes the following significant article, which, by the way, is a pretty clear exhibit of the general feeling existing among consumers of coal:

"Now that the election is over and the anarchists hanged, it might be well for the American people to decide what they are going to do about the coal question. In one Western city the schools have been closed

because the authorities could not procure the necessary fuel to heat the school buildings.

"In Buffalo the dealers have been at times unable to procure coal at any price. It is understood that the difficulty is due solely to the refusal of the coal operators to agree with the miners, who are out on strike. The fact that a little group of men are able to prescribe the prices and the amount of the entire output of anthracite coal in the United States is of much more consequence to the people than furious speech of the sympathizers with the executed anarchists, to listen to which they are now straining their ears; it is also much more ominous to the welfare of the country. There is plenty of coal, and it is asserted that there is no lack of facilities for transporting it. The only thing that stands between the consumer and the coal appears to be the whim of the great lords of the Pennsylvania coal-fields. This sort of thing will not be allowed to go on indefinitely. The coal monopolists will speedily prove themselves very effective missionaries of some 'ism' that will enable the consumers to get at the coal. Nice customs, courtesy to great kings, and when the pinch becomes unbearable the fine weather regard for the rights of property, usually preserved so sacredly, will be 'temporarily suspended' in some perfectly regular manner. It is absurd to believe that a people who did away with an old world system of land tenure when it became oppressive, and who will probably not much longer be restrained from getting hold of land which the most sacred treaties have guaranteed to the Indians forever, can be induced to bear indefinitely the oppressive yoke of half a dozen coal corporations.

Dr. Holmes tells us there is always a flaw in a donkey's will, and when a vast number of people want something very badly they can always be relied upon to find a weak link in the political reasoning which keeps it out of their reach. It will be the part of wisdom in the coal magnates to be reasonable, lest a worse thing befall them."

Lake freighting light for several days, the result of meager stock of coal; rates nominally unchanged. The going figures for the past week were: 75c. to Chicago, Milwaukee and Saginaw; 50c. to Detroit, Toledo, Cleveland, Superior, and Duluth. Many vessels going into winter quarters here and elsewhere on the lakes. Closing 25c. higher, as $1.00 was paid for a few loads to Chicago and Milwaukee.

The shipments of coal by lake westward from November 10th to 16th, both days inclusive, were 55,487 net tons, namely, 23,560 to Chicago, 17,790 to Milwaukee, 2600 to Duluth, 5780 to Toledo, 1000 to Superior, 1070 to Detroit, 1720 to Saginaw, 1650 to Cleveland, 100 to Bay City, 150 to Osceola, and 100 tons to various Canadian ports. Total for season, not including vessels from Tonawanda, which load here without reporting at Custom House, 1,642,731 net tons.

The canals of the State will close December 1st, unless sooner by ice. The superintendent says this is necessary in consequence of the improvements to be made during the winter, including the lengthening of 16 locks on the Erie, two on the Oswego, and others rebuilt on the Black River canals.

No receipts or shipments by canal during second week in November at this port.

Two loads of coal dust shipped to-day by canal hence to Oriskany at 90c. net ton, free on and off.

Pittsburg.

[From our Special Correspondent.]

Coal.—So far as we are concerned there has been no change in the situation. The market is firm, with a good demand. The advance in the price noted in our last was maintained. The inhabitants on the Ohio, from Cincinnati down, are suffering for the want of fuel, and no relief in sight. A rise in the Ohio is what will give relief.

PRICE OF COAL PER 100 BUSHELS.

First pool	$4.75	Fourth pool	$3.25
Second pool	4.25	Railroad coal	$5.00@5.25
Third pool	$3.75		

Connellsville Coke.—The situation is without change. The cry is still for more cars. The yards are crowded with coke waiting shipment. The rates are: Blast furnace, f.o.b,, $2 per ton. Foundry, $2.30; Crushed, $2.60.

FREIGHTS.

The latest actual charters to November 17th, per ton of 2240 pounds:

From Baltimore to:—Bangor, 1.50; Bath, 1.50; Boston, 1.50; Bridgeport, 1.35; Bristol, 1.35; Charleston, 80@90; Fall River, 1.35; Galveston, 3.00; New Bedford, 1.35; Newburyport, 1.65; New Haven, 1.35; New London, 1.35; New York, 1.15; Portland, 1.50; Portsmouth, N. H., 1.60; Providence, 1.35; Quincy Point, 1.60; Salem, 1.50; Savannah, 1.10@1.20; Somerset, 1.35; Williamsburg, N. Y., 1.15; Wilmington 1.00. Freights firm and tonnage scarce.

From Philadelphia to:—Alexandria, 85; Bath 1.30*; Baltimore, 60§; Boston, 1.40@1.60; Gloucester, 1.50@1.60; Charleston, 75; Charlestown, Mass., 1.35@1.50*; Lynn, 1.55@60; Newark, 90§; New Brunswick, 80§; New Orleans, 2.00; New York, 90§; Norfolk, Va., 60; Portsmouth, Va., 60; Richmond, Va., 75; Savannah, 1.00; Washington, 85.

From New York to:—Boston, 1.10*; Bridgeport, Conn., 75; Bristol, 90; Cambridge, Mass., 1.10*3c.; Cambridgeport, Mass., 1.10*3c.; Charlestown, $1.10;* Chelsea, 1.10*; Com. Pt., Mass., 1.10*; E. Boston, 1.10*; E. Greenwich, R. I., 1.00; New Bedford, 1.00; Newburyport, 1.25*; New Haven, 80; Newport, 90; Norwich, 90; Portland, 1.10*; Portsmouth, N. H., 1.20*; Providence, 90; Salem, 1.10*; Somerset, 1.00.

* And discharging. † And discharging and towing. 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. †† Pilotage. ** Below bridge. * Old B. L.

MARKETS.

NEW YORK, Friday Evening, Nov. 18.

Prices of Silver per ounce troy.

Nov.	Sterling exchange	Lond'n Pence.	N. Y. Cents	Nov.	Sterling exchange	Lond'n Pence.	N. Y. Cents
12	4.85	*	95¼	16	4.85	43¾	94⅞
14	4.85	43⅞	95⅛	17	4.85	43⅞	95⅛
15	4.85	†	94¾	18	4.85	‡	95¼

* 43 15-16. † 43 11-16. ‡ 43⅞@44¼.

Indian council bills were awarded this week at an advance of 1-16d. per rupee, and silver, which has been dull at 43 11-16d., responded with an advance of ⅛d.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains at 4 per cent. During the week, the bank lost £54,000 bullion, and the proportion of its reserve to its liabilities was raised from 47·11 to 47·72 per cent, against a gain from 40 5-16 to 42 7-16 per cent in the same week of last year. The weekly statement of the Bank of France shows a loss of 6,600,000 francs gold and a gain of 50,000 francs silver.

Copper.—After the sharp relapse of last week, the improvement, which we noticed in our last issue as having already commenced, has made further progress, and during the whole of the week a very strong tendency has manifested itself. In this improvement London has again taken the lead and Chili bars have risen from day to day, closing at £49 2s. 6d. The decrease in the statistics for the first half of this month has been cabled as 500 tons, which is not very much, and there must either have been large arrivals, or the deliveries have not been equal to expectation; but on these points we must await further information. The home market has not advanced to the same extent as the foreign, no doubt owing to the fact that some speculators had rather unpleasant experiences last week, and this has led to operations being entered into with more caution. The trade is also watching the rise with some amount of suspicion. Under all the circumstances this feeling is not surprising, as prices have for some years been considerably lower than they now are, even after the recent sharp rise, and the impression with some parties is that the rise has been rather too rapid to last. Producers have, of course, much cause for congratulation at the advance in prices, and they have more or less profited by selling ahead, with one important exception, viz., the Calumet & Hecla Company, which still remains out of the market, and apparently is unwilling to make any large contract ahead.

Whatever turn the market may take it is hardly to be expected that the low prices which brought scarcely any profit to anybody will be seen again for some time. Prices close very firm, 12·30@12·35 cash, 12·45@12·50 December, 12·55@12·60 January, 12·60@12·65 February. Casting brands are worth 11¾c., and even 12c. is asked. Chili bars in London, £49 2s. 6d. @£49 5s. spot; £49 12s. 6d.@£49 15s., 3 months prompt, being the highest prices touched since the rise.

A correspondent on another page takes an unusually gloomy view of the prospects of overproduction.

The production of copper in this country this year will not exceed and will probably be less than in 1886, when it was 161,000,000 pounds, including the copper produced from imported ores.

In 1886 our consumption increased about 26 per cent. on that of 1885, and it seems probable that it has increased nearly as much again this year. Stocks are very low, never, in fact, were lower, and there are but few mines that can suddenly increase their output. In Montana the Chambers syndicate mines will certainly not equal Anaconda, though this will be more likely to decline than increase its present rate. The Boston & Montana Company will, of course, become a large producer.

Some of the Arizona mines may increase somewhat, but new mines cannot be opened to large production in a year.

The Lake Superior district, notwithstanding the increased output from Tamarack, will be less this year than it was in 1886. On the whole we see nothing to indicate a serious relapse in prices, in the near future and it would not surprise us to see 13 cents obtained for Lake copper, within a very brief period. At the same time the rise has been too rapid to be altogether healthy, as already stated, and it may fluctuate while still advancing.

Tin.—The market for this article is still very strong, but the amount of business doing has decidedly decreased, and consumers are buying with the greatest caution. It is, in fact, not too much to say that outside of the Exchange merely a retail business is now being transacted. The large increase of supplies from the Straits will rapidly augment the visible supplies and the stocks. Manufacturers of tin plates, etc., are unable to obtain a proportionate advance of price on their goods, and evidently prefer to come to a partial standstill rather than to work at a loss by paying the present high prices for tin. Of course, the two causes named must ultimately have a serious effect on the statistics, and the utmost caution is therefore necessary in any operations in the article. The prices in our market have not shown so much fluctuation as during the preceding weeks, when our prices rose rather above the parity of the London market, but now London has made up the difference and the market closes very firm in London at £140 10s.; closing prices are irregular, 30¾@31¼ spot and 28½@29 for late futures.

Lead still continues rather flat, and has been freely offered at 4·25c., at which price about 400 to 500 tons have changed hands. As the season approaches when the consumption of lead is at its lowest point, there appears to be very little desire to operate in the article. Cable advices from London report a weakish tone with downward tendency, and the price of Spanish lead has fallen to £12 12s. 6d., at which price sellers remain.

Messrs. Everett & Post, of Chicago, telegraph to-day as follows: Market quiet and dull, prices unchanged, but latterly a shade weaker on rumors that some lead was offered at 4·15. Offerings are very light. Sales during the week amount to 200 tons corroding, 4·25. Latterly, 100 tons resale at 4·17½.

Antimony keeps very strong, and prices have been put up for Cookson's to 9⅜@9⅞c., and for Hallet's to 9¼@9⅝c., but not much business has been done at the advance.

Spelter is somewhat firmer, and domestic can not be obtained below 4⅞@5c. Sheet Zinc is in demand at 6⅜@6¾c. In London the quotations have again improved to £16 17s. 6d. for ordinaries, and £17 5s. for specials, while producers are said to be now asking even more than these prices. Silesian is now held for 5·55c. to 5·60c., but up to the present only small transactions have taken place at this advance.

Sheet Zinc remains active at 6⅜@7c.

Nickel remains in a satisfactory position, with quotations unaltered at 65c.

Quicksilver.—The English market remains firm at £7 15s. The market is unchanged, the price remaining at $42½ per flask.

Chemicals.—Refined alkali continues to receive no attention, and there is no change to report in the prices we gave last week. In caustic soda, very much the same feeling is reported, the only quality for which there is any thing like a demand being 70 to 74 per cent. This may probably induce some slight reduction in prices for all degrees of strength within the next week or two, but it is impossible to speak with any certainty.

Our correspondents in Liverpool and London continue to speak very cheerfully of the present and probable future outlook, and advise us that it would be difficult to place large orders for bleaching powder at any thing less than £8 to £8 2s. 6d. for delivery over the first six months of 1888. Very little is available for prompt shipment, and certainly nothing at less than the former of these figures. Caustic soda continues to be quoted at £6 for 60 per cent, £7 for 70 per cent, and £7 15s. for 74 per cent each in Liverpool, and for the most part popular brands. Sal soda is perhaps a trifle weaker, though still nominally held at £2 10s. to £2 15s. for best brands, while salt cake calls for no particular comment.

There is nothing new to say of sulphuric acid; the demand is a normal one, and the prices are unchanged. Brimstone continues to be firm and to preserve its upward tendency—the freights being higher—and vessels somewhat rare. We hear of the arrival of some 1000 tons during the week, but as this reached us in fulfillment of contracts previously made, it cannot be said to have influenced the market. Best seconds are now quoted at $24.50 to $25 on the spot, and at $23 to arrive in January or February, thirds being held at $21 per ton for same date of shipment. There is no new feature in nitrate of soda, our quotations of last week being maintained to date.

English and American sal-soda continue to be demanded in jobbing lots and are well and firmly held in consequence of a limited supply. We hear of sales during the week aggregating some 150 tons of English, at about 1⅛c., and a similar quantity of domestic production at the same figures less the usual discount.

Newcastle and Liverpool brands of soda are, as we predicted last week, assuming even a more decidedly firm tone than we then had to record. There is literally no supply of either on hand, and very little coming forward that has not been disposed of at good rates and in advance. This movement is in entire sympathy with the feeling on the other side, where a very independent feeling prevails among all the manufacturers. The small lots that were available for consumption during the week were rapidly snapped up at from $1.25 to $1.30 per 100 pounds, and nothing can be purchased for near delivery under $1.20, and even that figure only applies to comparatively large parcels.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 18.

This week closes with a decidedly hopeful feeling in all branches of the iron and steel trades. The general opinion is that the outlook for good business continuing through next year is excellent.

The tendency of manufacturers and merchants to work together has been very marked. From Germany we hear of a rolling-mill pool, which is a combination of mills to regulate production and prices of rolled iron. Prices are said to have advanced under this arrangement to 50 per cent above English prices. The German wire rod makers have also formed an association to regulate production. It is not yet known what influence this will have on prices, but that an influence is expected is shown by withdrawal of quotations on wire rods by leading importers in this city.

The chief matter of interest in this country was the meeting of the steel rail makers at Philadelphia, on Tuesday. The general feeling at this meeting was that the outlook for 1888 is excellent, and that prices will not be any lower. No action was taken to fix prices, the mills being left free,

WEEKLY REGISTER OF

CURRENT QUOTATIONS.

This list is the result of careful compilation and is destined to meet the demands of all classes of subscribers. The prices quoted are those actually ruling in our own and foreign markets. Manufacturers and importers will please give notice of all modifications not later than Friday noon each week.

CHEMICALS.

Acid—Sulphuric, 60°, per 100 lbs.. 80
Sulphuric, 66°, per 100 lbs 90
Hydrofluoric, per 100 lbs..... 95
Muriatic, 18°, per 100 lbs 1.15
Muriatic, 20°, per 100 lbs.... . 1.25
Nitric, 36°, per 100 lbs 4.00
Nitric, 42°, per 100 lbs 6.00
Alkali—36 p. c 1.10
Refined, 58° 1.15
Alum—Lump, per lb..... ..... 1¾
Ground, per lb..... 2
Lump per ton, Liverpool £5
Sulphate of Alumina £4 12 0
Aluminum—(Metallic), per lb ..12.00
Ammonia—Sulph., per 100 lbs.. 3.00
Carb., per lb..... 7¾
Muriate, per lb..... 7
Antimony—Hallet's, per lb..... 8¼
Cookson's, per lb 9¼
Arsenic—Metallic, per lb..... 32
White, powdered, per lb..... 2¾
White, glass.. ....
Red, per lb 6½
White, at Plymouth, per ton. .£21 0 0
Asbestos—American, p. ton..... 20 00
Italian, p. ton, c. i. f. L'pool ...£18 0 0
Asphaltum—P. ton 13.00
Prime Cuban, ₽ lb .. .. 5@6c.
Hard, ₽ ton..... ... . $28.00
Trinidad, refined, ₽ ton $30.00
Barium—(Metallic), per lb 975.00
Barytes—Sulph., Am. prime white16.00
Sulph., foreign, floated, p. ton....19.00
Sulph., off color, p. ton 12.50
Carb., lump, f.o.b. L'pool, ton £6 0 0
No. 1, casks, Runcorn " " £4 10 10
No 2, bags, Runcorn " " 3 15 0
Bismuth—(Metallic), per lb..... 2.40
Bleach—Over 35 p. c., per lb..... 2¼
Borax—Per lb 6¼
Refined at Liverpool, per ton..£26 10 0
Bricks—Pale, per 1,000 ..... 5.00
Jerseys, per 1,000 ..... 7.50
Haverstraw, per 1,000 .... 8.50
Front bricks, per 1,000, from.....10.00
Brimstone—*See Sulphur.*
Bromine—Per lb..... 36
Building Stone—Amherst freestone, per cu. ft., from..... 75
Brownstone, per cu. ft., from..... 1.00
Granite, rough, per cu. ft., from.. 45
Cadmium—(Metallic), per lb..... 1.45
Calcium—(Metallic), per oz.....150.00
Cæsium—(Metallic) .....
Cerium—(Metallic) per oz 168
Cement—Rosendale, per bbl..... 1 00
Portland, American, per bbl..... 2.00
Portland, foreign, per bbl..... .... 2 25
Chalk—Per ton.. .... 3.00
Precipitated, per lb..... 4
China Clay—English, per ton....18.50
Southern, per ton..... .....13.50
Chrome Yellow—Per lb 8
Chromium—(Metallic), per lb...200.00
Cobalt—(Metallic), per lb..... .... 7.00
Cobalt—Oxide, per lb..... .. .. 2.15
Copper—Sulph. English Wks.,ton£13 10 0
Precip., English Works, unit..fluctuating
Copperas—Common, per lb ....$ 70
Best, per lb..... .. .. 1.20
Liverpool, per ton, in casks, £2.... 1.20
Cream of Tartar—Am. 99 p. c. lb 35
Powdered, 99 p. c..... 36
Didymium—(Metallic), per oz...160.00
Emery—Grain, per lb 3½
Flour, per lb 2½
Erbium—(Metallic), per oz 140.00
Feldspar—Ground, per ton.. ...14.00
Fuller's Earth—Lump, per bbl. 95
Powdered, per lb.. 2
Gallium—(Metallic), per oz 3250.00
Glucinum—(Metallic) .....
Green—Emerald, per lb..... 25
Brunswick ....
Gypsum—Calcined, per bbl.. .... 1.25
Indium—(Metallic), per oz..... 158.00
Iodine—Resublimed..... 3.50
Iridium—(Metallic), per lb.. ...700.00
Kainit—Per ton..... .... .. 7.25
Kaolin—*See China Clay.*
Lanthanum—(Metallic), per oz.175.00
Lead—Red, per lb..... 6
White, American, in oil, per lb.... 6¼
White, English, per lb 7½
Acetate, or sugar of 12
Litharge—Powdered, per lb 5½
English flake, per lb..... 9
Lithium—(Metallic), per oz. 160.00
Magnesite—Syrian, per ton.. ...15.00
Magnesium—Per lb.... .... 4.00
Mineral Wool—Per lb 2
Mica—
In sheets according to size, 1st quality, ₽ lb..... .. ..
In sheets according to size, 2d quality, ₽ lb..... .. ..
Molybdenum—(Metallic) per lb 6.00
Nickel—(Metallic), per lb.. .....125.00
Niobium—(Metallic), per oz.....128.00
Osmium—(Metallic), per lb 640.00
Palladium—(Metallic), per lb...512.00
Platinum—(Metallic), per lb ..148.00
Phosphate Rock—S. Carolina, per ton f. o. b. Charleston..... 5.80
Ground, per ton f. o. b. New York.10.00
Canadian Apatite, lump, f. o. b. at shipping port, per unit..... 24
Manganese—lump, c. i. f. Liverpool, per ton.....£3 2 6
Per unit, up or down..... .....£0 1 3
Ground..... .....£6 0 0
Metallic, per lb 1.10
Mercury—*See Quicksilver.*
Mercuric-Chloride—(*Corrosive Sublimate*) per lb..... 55
Phosphorus—Per lb..... 70
Plumbago—Ceylon, per lb..... . 4
American, per lb..... 7
London, per cwt £0 15 0
Potassium—Metallic, per oz..... 2.00
Cyanide, per lb ....
Bromide, per lb..... 37
Chlorate, per lb..... 14
Carb. per lb 5
Caustic, per lb..... 7½
Iodide..... ... ... 2.10
Muriate, per 100 lbs..... 1.70
Nitrate, refined, per lb..... 6
Bichromate, per lb.... ..... 10½
Sulphate, per 100 lbs... ... . 1.10
Yellow Prussiate, per lb.... 19
Red Prussiate, per lb... 42
Pumice Stone—Select lumps, per lb..... ... . 2½
Original cks., per lb..... . ... 1½
Powdered, pure, per lb.. ..... 1¾
Pyrites—Non-cupreous, p. unit, s. 10
Quartz—Ground, per ton 18.00
Quicksilver—Per lb. 53
London, per flask of 75 Ho ...£7 15s. 0d.
Rotten Stone—Powdered, per lb. 8½
Lump, per lb 5
Eng., powdered, per ton £4
Lump, per ton £5
Rhodium—(Metallic), per lb ...512.00
Ruthenium—(Metallic), per oz..112.00
Rubidium—(Metallic), per oz... 200.00
Salt—Liverpool, ground, per bbl. 70
Turk's Island per bbl 25
Salt Cake—Per 100 lbs 55
Saltpeter—Crude, per lb... ... .. 4½
Refined, per lb 6
Selenium—(Metallic ..... .
Slate—Purple and green roofing, per 100 ft..... ..... 6 00
Red roofing, per 100 sq ft... ....15.00
Black, roofing, per 100 sq. ft. ... 5.00
Soda Ash—Carb., 48 p. c., p. 100 lbs 1.30
Caustic, 48 p. c., per 100 lbs . . 1.35
Caustic, 70 p. c., per 100 lbs..... 1.18
Sal, English, per 100 lbs 1.30
Sal, American, per 100 lbs 1 15
Nitrate, per 100 lbs..... .... 2.00
Sodium—(Metallic) per lb.. ..... 4.50
Spelter—See Zinc.
Strontium—(Metallic), per oz..128 00
Nitrate, per lb 10½
Sulphur—Roll, per lb..... .... 1½
Flour, per lb 1¾
Crude Brimstone, 2s., per ton ...20.00
Crude Brimstone, thirds, per ton..19.00
Talc—Ground French, per lb.. ... 1¼
Domestic, per lb 6
Domestic, per ton..... ... .15.00
C. i. f. Liverpool, per ton... ... £4 5 0
Tannin—Pure, per lb. . . ..
Tantalum—(Metallic) per oz .. 144.00
Telurium—(Metallic) per oz.... 9 00
Thallium—(Metallic) per oz 3.00
Titanium—(Metallic) per oz....32.00
Thorium—(Metallic) per oz 272.00
Tungsten—(Metallic) per oz..... 4.00
Vanadium—(Metallic), per oz..320.00
Vermillion—American, per lb... 50
English, per lb. 65
Vitriol—(Blue), Ordinary, per lb.. 4½
Extra, per lb 4¾
Yttrium—(Metallic), per oz 144.00
Zinc oxide—Am., Dry, per lb.... 4¼
Antwerp, Red Seal, per lb..... 5⅝
Paris, Red Seal, per lb 6⅛
Zirconium—(Metallic), per oz..240.00

IRON AND STEEL.

New York Prices.

American Pig-Iron,
No. 1 X ... .$20.50@$21.50 at tidewater
No. 2 X..... $18.50@$19.50 " "
Forge.. ... $17@ . .... " "
Scotch Pig—Coltness... .$21.25@$21.50
Clyde.. .... 19.75@ 20.00
Dalmellington..... ..... 19.25@ 19.25
Summerlee..... ..... 21.00@ .....
Gartsherrie..... ..... 21 00@ .....
Shotts... .... 21.00@ .....
By Cable to-day to the Metal Exchange:
Scotch Warrants..... ..... 39s. 5d.
Coltness, at Glasgow .... 50s.
Langloan, at Glasgow ..... 47s.
Summerlee, at Glasgow..... 49s. 6d.
Gartsherrie, at Glasgow.... .....46s.
Glengarnock, at Ardrossan. ....46s. 6d.
Dalmellington, at Ardrossan.....41s. 6d.
Eglinton, at Ardrossan ... . 41s.
Bessemer Pig—
Foreign, nominally..... $19.75@$20.00
Domestic.
Spiegeleisen—
German, 20 per cent.. .. $26.00
English, 20 " " .....$26 50@ 27.00
" 30 " " 31.00
Ferro Manganese..... 55.50
Steel Blooms..... 30.00@ 30 50
Steel Billets .... 30.00@ 30.50
Steel Nail Slabs. ..... 30.50@ 31.00
Steel Wire Rods.. ....
Steel Rails—
Heavy sections, at mill....$32.00@ .....
Light " " .... 56.00@ 40 00
Structural Iron and Steel—
Bridge Plate, at mill.. ....2¼@2·3c.
Angles, at mill ....2·3@2·4c.
Tees, at mill..... .....2 6@2·8c.
Steel Angles, at mill ....2·6@2·75c.
Beams and Channels, on wharf, 3·3c. base.
Steel Plates—
Tank and Ship, on wharf.. .... 2·85@3c.
Boiler Shell, on wharf... ....3 @3¼c.
" Flange, " ... ... 3½ @3¾c.
" Fire-Box, on wharf.... 4 @4½c.
Iron Plates—
Common tank, on wharf. . . .2·4@2·5c.
Refined tank, on wharf..... .2·5@2·6c.
Boiler shell, " ..... .2·7@2·8c.
Boiler flange, " ....3·7@3·8c.
Extra flange, " .....4¼@4½c.
Bar Iron—
Refined..... .....2@2·1c. base.
Common..... ..... 1·9@2c. "
Merchant Steel—
American tool .... 8½@10c.
Special grades..... ..... 13 @20c.
Crucible machinery ..... 4½@6c
" spring..... .. .. .. 4½c.
Bessemer machinery..... ..... 2·7@3c.
" spring. . . .. 2·7@3c.
Cast-Iron Pipe—
According to size..... $28 00@$35.00
Wrought-Iron Pipe—List adopted Oct. 26, 1887.
Butt-Welded, Plain and Tarred, 47½ per cent disc.; Galv., 37½ per cent disc.
Lap-Welded, Plain and Tarred, 57½ per cent disc; Galv., 45 per cent disc.
Boiler Tubes—52½ per cent disc.; Casing, 50 per cent disc.
Rail Fastenings—
Spikes..... ..... 2·3 @2·4c. delv'd
Angle Fish-bars..... .2·15@2·2c.
Bolts and Sq. Nuts .....2·9 @ 3c.
" " Hex " . ....3·1 @3·2c.
Wrought Scrap—
Foreign *ex ship*.....$20.00@$20.50
No. 1 Yard .... 21.00@ .....
Cast Scrap .... 15.00@ 16.00
Old Car Wheels.... ... 19.00@ 19.50
Old Rails—Tees .. .... 21.50@ 21.75
—Doubles ..... 22.00@ 22 50
Nails—In car-load lots. ... 2 00@ ....
—From store .... 2.05@ ...

ALUMINUM.

Bronze (10 %), ₽ lb..... ..... 40c.

COPPER.

Lake Ingot, ₽ lb ....
Electrolytic, ₽ lb ....
Casting Brands, ₽ lb ....
Arizona Black .....
Matte, ₽ unit of Copper .....
Chili Bars, London, ₽ ton.....
Am. Matte, Liverpool, ₽ unit.....
Sheet Copper (according to size), ₽ lb..... .....20 @33c.
Lead—
Domestic, Common .....
Domestic, Refined ....
Foreign ....
Sheet ₽ lb..... ..... 5 @ 6c.
Pipe, ₽ lb .... 4½@ 5½c.
Tin lined Pipe, ₽ lb..... 12c.
Shot, ₽ lb..... 5c.
Tin—
Banca pigs, ₽ lb ....
English, pigs, ₽ lb..... .....
Straits, pigs, ₽ lb .....
Straits in bars, ₽ lb .....
Ch., bright I. C., ₽ box.....
Coke, bright, ₽ box. .....
Coke, Ternes, ₽ box.. . ...
Zinc—
Domestic spelter, ₽ lb. .....
Foreign spelter, ₽ lb..... .....
Silesian, London, ₽ ton..... £
Sheet, American, ₽ lb .. ..
Sheet, foreign, ₽ lb.....

Louisville Prices.

Pig-Iron—
So. Coke, No. 1 Foundry..$20.50@$21.00
" " No. 2 " .. 19.50@ 20.00
" " No. 2½ " .. 18.50@ 19.50
Hg. Rock Coke, No. 1 F'dry 20.00@ 20.00
" " Charcoal, No. 1 Foundry ..... 23.00@ 24.50
So. Charcoal, No. 1 F'dry .. 21.00@ 22.00
Silver Gray, different gr'des 17.50@ 19.00
So. Coke, No. 1 Mill, Neutral 17.50@ 18.50
" " No. 2 " " 17.00@ 18.00
" " No. 1 Mill, Cold Short ..... 17.00@ 18.00
So. Charcoal, No. 1 Mill ....
White&Mottled, diff't gr'ds. 15.00@ 16.00
So. Car-Wheel, St'd Br'nds 24.00@ 25.00
" " Other " 22.00@ 24.00
Hanging Rock, Cold-Blast.. 24.50@ 26.00
" " Warm-Blast 21.00@ 22.50

Philadelphia Prices.

Foundry No. 1..... ... $21.00@22 00
Foundry No. 2. . ..... 18.50@19 50
Gray Forge..... ..... 17.00@17.50
Bessemer Pig..... .... 18.00@. ...
Steel Rail Blooms ..... 29.50@. ...
Foreign Bessemer. ..... 20.25@21.00
Spiegeleisen. ... . 27.00@27.50
Scrap, Selected..... 22.00@. ....
No. 1 ..... 21.00@. ....
Cargo Scrap..... .. .. .. 21.00@. ....
Muck-Bars.. .... 31.00@. ...
Merchant Iron... ... . 1.90@@2.10c.
Plate Iron..... 2.30@ 2.50
Tank Iron..... 2.40@ 2.50
Sheet Iron..... 2.00@. ....
Angles..... ... 2.30@. ...
Beams and Channels..... .. 3.30@. ....
Nails .... 2.00@ 2.15
Steel Rails. .... 34.00@34.50
Old Rails. ..... 22.00@22.50

Pittsburg Prices.

Coke or Bituminous Pig—
Foundry No. 1 ....$19.75@20.00
Foundry No. 2..... .... 18.50@19.00
Gray Foundry No. 3..... 17.25@17.50
" " No. 4... .. .. 17.00@17.25
White 17.00
Mottled..... ..... 17.00
Silvery 19.00
Bessemer..... ..... 19.00@19.5
Charcoal Pig—
Foundry No. 1. .... 25.00@25.75
Foundry No. 2..... . .. 24.00@24.75
Cold-Blast..... .... 26.00@30.00
Warm-Blast..... .... 25.00@27.00
20 p. c. Spiegel..... 28.00@28.50
Muck-Bar..... ..... 30 75@31.00
Steel Blooms..... ..... 32.00@33.00
Steel Slabs .... 31.00@32.00
Steel Crop Ends.... .... 21.00
Steel Bloom Ends.. ..... 20.50
Steel Billets .... 30.25@30.50
Old Iron Rails... .... 24.50@25.00
Old Steel Rails..... .... 23.50@24.00
No. 1 W. Scrap..... ..... 20 00@20.25
No. 2 W. Scrap.... .... 18.00@18.25
Steel Rails..... .... 35.00@36 00
" light sections... ..... 36.00@39 00
Bar Iron., nominal..... 1.90@ 2.00
Nails $2 net car lots.
Steel Nails $2 net car lots. Two per cent off for cash.

STOCK MARKET QUOTATIONS

Baltimore Stock Quotations.

Company.	Bid.	Asked.
Atlantic Coal....	$1.40@$1.50	$1.50@$1 60
Balt. & N. C.	.35@.39	.40@.50
Big Vein Coal..	....	....
Conrad Hill . ..	.10	.20@.25
Diamond Tunnel	.40@.50	50
George's Crk. C.	95.00@99.13	$104@105
N. State. Balto..	.20@.50	.74
Ore Knob	05	.10
Silver Valley	1.55	1 65

Highest and lowest prices bid and asked during the week ending November 17th.

Birmingham, Ala., Stock Quot.

Company.	Bid.	Asked.
Ala. Conn. C...	....	99
Bir. Min. & Mfg.	115 @125	....
Decat. L. Imp. & Fur.....	25½@ 26	26½@ 26⅝
Decatur Min. L.	....	25
Enterprise Mfg	....	100
Sloss I. & S....	27 @ 29	29½@ 35
*Sloss I. & S..	....	....
Sheffield C & I.	‡81 @ 82	84½@ 85
WoodstockS&I	50	....

* Bonds. †Seller 30 days. ‡Buyer 60 days.

Highest and lowest prices bid and asked during the week ended November 12th.

Deadwood-Dak. Quotations.

Comp'y.	H.	L.	Comp'y.	H.	L.
Bullion. .	.06	.03	Mugw'mp	.02¼	....
C'nt'e Sh't	.03	.01½	Poc'h'ntas	03½	.01
Cora	.06	.06	Rattler .	.25	.10
Est'rp'se.	.02¼	.02	Ruby Bell	.10	.03
Eureka ..	.04	.04	Seabury..	.20	.16
Hester A.	.06	.03	Seg'eg'ted	.07	.05
Iron Hill.	3.50	2.90	Silv'r Kid'e	.07	.06¾
Jefferson.	.09	.08	Sp'nish R.	.26	.10
Liberty ..	....	....	U. S. Ge'nt	.01½	.01½
Minna ...	02½	.01	West Va .	.05	.01
Mutual. ..	.10	09			

Highest and lowest prices bid and asked during the week ended November 12th.

Pittsburg Stock Quotations.

Company.	H.	L.	Closing.
Bridgewater Gas ..	100.00	100.00	100.00
Chartiers Val. Gas.	90.00	81.00	84 75
Columbia Oil Co..	....	....	....
Consignee Min. Co.	.50	.50	.50
Hazlewood Oil	94 50	94.50	94 50
Forest Oil Co . ..	95.00	80.00	90 00
La Noria Mining ..	4.00	3.50	3.75
M'f'turers' Gas ..	15 00	15 00	15.00
Mansf'd C & C. Co.	27.50	27 50	27.50
Nat. Gas Co., W. Va.	.....	....	....
N. Y. & Cleve. Gas Coal.....	43.00	40.00	43 00
Ohio Valley Gas...	48 00	47.00	47.00
Pennsylvania Gas.	25.00	25.00	25.00
Philadelphia Gas..	49.25	48.50	49.00
Pine Run Gas Co..	49.75	49.25	47.75
Silverton Mining..	2.50	2.50	2.50
South Side Gas.. .	55.00	55.00	55.00
Tuna Oil Co.....	....	....	....
W't'h'se Air-Brake.	130.00	120.00	125.00
W't'ghouse Brake.	60.00	56.00	60 00
Westmoreland Cambria Gas	....	....	....
Wheeling Nat. Gas	29.00	27.00	27.50
Yankee Girl Mining	6.50	5.50	5 50

Highest and lowest prices bid and asked during the week ending November 10.h.

London Quotations.

Company.	Highest.	Lowest.
Alturas Gold, Idaho...	17s.	16s.
Anglo-Montana, Mont..	....	....
Arizona Copper, Ariz..	£½	£⅜
Birdseye Creek, Cal.. ..	8s.	6s
California Gold, Colo..	8s. 6d.	7s. 6d.
Carlisle, N. Mex	£1¼	£1
Centennial, Cal	£1	£¾
Charles Dickens, Id ...	6s. 6d.	5s. 6d.
Colorado United, Colo.	20s.	15s.
Denver Gold, Colo.....	2s. 6d.	1s. 6d.
Eberhardt, Nev	5s	4s. 6d.
Empire, Mont	£3¼	£3
Flagstaff, Utah.....	4s. 6d.	3s. 2d.
Garfield, Nev...	£1½	£1
Gold Hill, N. C.....	2s. 9d.	2s. 3d.
Kohinoor, Colo.....	2s. 6d.	1s. 6d.
Montana Lt., Mont	£⅜	£⅜
New California, Colo...	8s. 6d.	7s. 6d.
New Consolidated ..	3s.	2s.
New Emma S., Utah..	5s.	4s. 6d.
New Hoover Hill, N. C.	3s.	2s.
New La Plata, Colo...	2s 6d.	2s.
Plumas Eureka, Cal....	£⅝	£⅜
Richmond Con., Nev...	£4⅜	£4⅛
Ruby & Dunderberg, Nev	4s. 6d.	3s. 6d.
Russell Gold, N. C.....	3s.	2s. 6d.
Sierra Buttes, Cal... ..	£1	£¾
Stanly, N. C.....	£1⅛	£⅞
Union Gold, Colo.....	7s.	7s.
U. S. Placer, Colo.....	£1	£¾
Viola Lt., Idaho	16s.	15s.

Highest and lowest prices November 5th.

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par	Assessments. Total levied.	Assessments. Date and amount of last			Dividends. Total paid.	Dividends. Date and amount of last.		
1	Adams, S. L.	Colo.	$1,500,000	150,000	$10	*				$555,000	Jan	1887	.15
2	Alice, S. C.	Mont	10,000,000	400,000	25	*				750,000	Sept	1886	.06¼
3	Alturas, G	Idah.	1,500 000	3 00,000	5					95,000	Sept	1886	.50
4	Amie Con., S. L.	Colo.	5,000,000	500,000	10	*				330,000	Oct.	1883	.05
5	Amy & Silversmith, S.	Mon.		341,419						247,530	Aug	1887	.12½
6	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	360,000	Jan.	1887	1.00
7	Argenta, S	Nev..	10,000,000	100,000	100	295,000	July	1885	.10	40,000	Feb.	1880	20
8	Aurora, L.	Mich.	2,000,000	100,000	20					155,000	Oct	1887	1.87½
9	Bassick, G. S.	Colo.	10,000,000	100,000	100	*				400,000	Mar.	1884	1.00
10	Belle Isle, S.	Nev..	10,000,000	100,000	100	160,000	Feb	1887	.20	300,000	Dec.	1879	.25
11	Belcher, G. S.	Nev..	10,400,000	104,000	100	2,269,335	Sept	1887	50	15,397,000	Apl.	1876	1.00
12	Bellevue Idaho, S. L.	Idah.	1,250,000	125,000	10	26,250	Dec.	1883	10	200,000	Jan	1887	.10
13	Big B'nd Hydraulic, G	Dak..	1,000,000	200,000	5	*				258,000	Aug	1887	.03
14	Black Bear, G.	Cal..	3,000,000	30,000	100	22,500	Dec.	1884	.25	895,000	May	1883	.20
15	Bodie Con., G. S.	Cal..	10,000,000	100,000	100	424,990	Aug	1887	.50	1,602,572	Apl.	1885	.50
16	Bonanza Developm't	C & M	3,000,000	300,000	10					135,000	Oct.	1882	.15
17	Bonanza K'g, Cons. S.	Cal..	1,000,000	100,000	10	*				185,000	Feb.	1885	.10
18	Boston & Mont, G.	Mont	2,500,000	250,000	10	*				520,000	Jun	1886	.15
19	Breece, S.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01
20	Brooklyn Lead, L. S.	Utah	500,000	50,000	10					127,000	July	1887	.05
21	Bulwer, G.	Cal	10,000,000	100,000	10	60,000	July	1887	.20	175,006	Jan.	1884	.10
22	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	40,000	Feb.	1886	.10
23	Calumet & Hecla, C.	Mich	2,500,000	100,000	25	1,200,000	..			29,350,000	July	1887	5.00
24	Carbonate Hill, S. L.	Colo.	2,000,000	200,000	10	*				80,000	Apl.	1884	.05
25	Caribou Con., S.	Colo.	1,500,000	150,000	10	*				50,000	Mch	1880	.10
26	Castle Creek, G.	Idah.	100.000	100,000	1					51,000	Oct.	1883	.03
27	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*				270,000	May.	1884	.10
28	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,820,000	Feb.	1887	2.00
29	Christy, S.	Utah	10,000,000	100,000	100					10,000	Jun.	1885	.10
30	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1,650,000	Dec.	1884	.25
31	Colorado Central, S. L	Colo.	2,750,000	275,000	10	*				241.375	Nov.	1887	.05
32	Cons. Cal. & Va., G. S	Nev..	21,600,000	216,000	100	108,000	Jan.	1885	.20	1,144,000	Oct	1887	.50
33	Con. Gold Mining, G.	Ga...	500,000	100,000	5	*				108,000	Nov.	1883	02
34	Contention, S.	Ariz.	12,500,000	250,000	50					†2,587,000	Dec.	1884	.25
35	Crescent, S. L. G.	Utah	15,000,000	600,000	25	*				210,000	Aug.	1886	.05
36	Crown Point, G. S.	Nev..	10,000,000	100,000	100	2,675,000	Feb.	1882	.25	11,588,000	Jan.	1875	2.00
37	Daly, S. L.	Utah	3,000,000	150,000	20					375,000	Nov.	1887	.50
38	Deadwood-Terra, G.	Dak..	5,000,000	200,000	25					11,000,000	Nov	1887	.10
39	Derbec B. Grav., G. S.	Cal..	10,000,000	100,000	100	90,000	Dec.	1881	.10	180,000	May	1887	.10
40	Dunkin, S. L.	Colo.	5,000,000	200 000	25	*				250,000	Oct	1887	10
41	Elkhorn, G. S.	Mont	1,000,000	100,000	10	50,000	July	1883	.50	180,000	July	1887	.05
42	Empire Lt., G.	Mont	500,000	100,000	5					33,000	Mar	1887	.05
43	Eureka Con., G. S. L.	Nev.	5,000,000	50,000	100	500,000	July	1886	1.00	4,868,000	Dec	1887	.25
44	Evening Star, S. L.	Colo.	500,000	30,000	10	*				1,400,000	Nov	1883	.50
45	Excelsior, G.	Cal..	10,000,000	100,000	100	560,000	Sept	1885	1.00	875,000	Oct.	1880	.25
46	Father de Smet, G.	Dak..	10,000,000	100,000	100	200,000	Nov	1878	1.00	1,125,000	Dec.	1885	.20
47	Franklin, C.	Mich	1,000,000	40,000	25	220,000	Jun.	1871	....	560,000	Dec.	1886	1.00
48	Freeland, G. S. C.	Colo.	5,000,000	200,000	25	*				190,000	July	1886	.10
49	Fresno Enterprise, G	Cal..	5,000,000	100,000	50					110,000	July	1882	.10
50	Garfield Lt., G. S	Nev.	500,000	100,000	5		Mch	1883	.10	25,000	Mar.	1885	.12½
51	Gould & Curry, G. S.	Nev.	10,800,000	108,000	100	4,213,400	Nov.	1887	.50	3,826,000	Oct.	1870	10.00
52	Grand Central, S.	Ariz.	1,000,000	100,000	10	*				625,000	Dec.	1882	.25
53	Grand Prize, S.	Nev.	10,000,000	100,000	100	570,000	Apl.	1886	.50	495,000	Mar.	1884	.25
54	Granite, S.	Colo.	125,000	25,000	1					6,250	May	1883	.01
55	Granite Mountain, S.	Mont	10,000,000	100,000	25					3,400,000	Nov.	1887	.50
56	Green Mountain, G.	Cal..	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½
57	Hale & Norcross, G. S	Nev..	11,200,000	112,000	100	5,086,800	July	1887	.50	1,598,000	Apl	1871	5.00
58	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.05
59	Hecla Con., S. G. L. C.	Mont	1,500,000	30,000	50					1,047,000	Aug	1886	.50
60	Hel'a Mg & Red, G. S. L	Mont	3,315,000	663,000	5	*				197,970	July	1886	.06
61	Holmes, S.	Nev..	10,000,000	100,000	100	300,000	Sept	1885	10	75,000	Apl.	1886	.25
62	Holyoke, G.	Idah.	200,000	200,000	1					27 000	Feb.	1883	.10
63	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	3,968,750	Nov	1887	.20
64	Honorine, S. L.	Utah	500,000	250,000	2	25,000	Jun.	1883	....	125,000	Sept	1887	.05
65	Hope, S.	Mont	1,000,000	100,000	10	*				183,252	Oct.	1887	.25
66	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				4,000,000	Nov.	1884	.50
67	Idaho, G.	Cal..	310,000	3,100	100					4,539,500	Apl.	1887	5.00
68	Ideal, S. L.	Colo.	1,500,000	50,000	10					15,000	Oct.	1886	.05
69	Illinois, S.	N.M.	100,000	100,000	1	*				25,000	Jan	1887	.25
70	Independence, S.	Nev..	10,000,000	100,000	100	340,000	Oct.	1886	.20	225,000	Sept	1879	.25
71	Indian Queen, S.	Nev..	250,000	125,000	2					368,750	July	1883	03
72	Inyo, G.	Cal..	500,000	100,000	5	*				45,000	Apl.	1882	.05
73	Iron Hill, S.	Dak.	2,500,000	250,000	10	82,500	Oct.	1885	....	158,250	Nov.	1887	.07½
74	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20					2,100,000	Oct.	1887	.20
75	Jackson, G. S.	Nev.	5,000,000	50,000	100	10,000	Nov	1880	.20	45,000	Oct.	1886	.10
76	Jocuistita, S.	Mex.	2,500,000	250,000	10					1,200,000	Feb.	1885	.50
77	Jumbo, G.	Colo.	2,000,000	200,000	10					15.000	Jun.	1887	.02½
78	Kentuck	Nev..	3,000, 000	30,000	100	342,000	Nov	1881	.30	1,600,000	Dec.	1886	.10
79	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30
80	Leadville Cons., S. L.	Colo.	4,000,000	400,000	10	*				433,000	Apl.	1887	.05
81	Lexington, G. S.	Mont	4,000,000	40,000	100	*				565,000	Jan.	1885	2.00
82	Little Chief, S. L.	Colo.	10,000,00	200,000	50	*				780,000	Mch	1885	.10
83	Little Pittsburg, S. L	Colo.	20,000,000	200,000	100	*				1,050,000	Mch.	1880	50
84	Manhattan, S.	Nev	5,000,000	50,000	100	300,000	Jun	1887	1.00	437,500	Feb	1886	.25
85	Marguerite, G.	Cal..	500,000	25,000	20					18,750	Oct.	1882	.25
86	Marion Bullion, G	N.C.	500,000							15,000	Jan.	1886	
87	Martin White, S.	Nev..	10,000,000	100,000	100	1,150,000	Mar.	1886	25	140,000	Dec.	1886	.25
88	Mary Murphy, G. S.	Colo.	350,000	3,500	100	*				87,500	Sept	1887	5.00
89	Minnesota, C.	Mich	1,000,000	40,000	25	420,000	Apl.	1886	1 00	1,826,000	Mar.	1876	
90	Mono, G	Colo.	5,000,000	50,000	100	610,000	Sept	1887	.50	12.500	Mar.	1887	.25
91	Montana, Lt., G. S.	Mont	3,300,000	660,000	5	*				1,247,400	July	1887	.75
92	Morning Star, S. L.	Colo.	1,000,000	100,000	10					750,000	Nov.	1887	.25
93	Moulton, S. G.	Mont	2,000,000	400,000	5	*				35,000	May	1887	.07½
94	Mount Pleasant, G.	Cal.	150,000	150,000	1	*				150,000	Feb.	1887	.30
95	Mt. Diablo, S.	Nev	5,000,000	50,000	100	137,500	Jun.	1880	2.00	80,000	July	1885	.20
96	Napa, Q	Cal..	700,000	100,000	7					290,000	Jan.	1885	.10
97	Navajo, G. S.	Nev..	10,000,000	100,000	100	45),000	Mar.	1887	30	325,000	Feb.	1885	.25
98	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*				30,000	Dec.	1883	.06½
99	New York Hill, G.	Cal..	5,000,000	50,000	100	62,500	Oct.	1885	.15	215,000	Aug.		.10
100	Northern Belle, S.	Nev..	5,000,000	50,000	100	425,000	Jan.	1884	8.30	2,400,000	Apl.	1883	50
101	North Belle Isle, S.	Nev..	10,000,000	100,000	100	250,000	Mar	1887	.50	30,000	Aug.	1881	.15
102	Ontario, S. L.	Utah	15,000,000	150,000	100					8,750,000	Nov	1887	.50
103	Ophir, G. S.	Nev..	10,000,000	100,000	100	4,057,800	Aug	1887	.50	1,595,000	July	1882	1.00
104	Original, S. C.	Mont	1,500,000	60,000	25					126,000	Oct.	1887	.05
105	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,022,500	Jan.	1887	1 00
106	Oxford, G.	N. S.	125,000	125,000	1	*				34,500	Oct.	1885	.02
107	Paradise Valley, G. S	Nev.	10,000,000	100,000	100	47,000	Mar.	1882	.15	150,000	Apl.	1887	.10
108	Parrott, C.	Mont	1,800,000	180,000	10					36,000	July	1887	.10
109	Peacock, S. G. C.	N.M.	2,000,000	200,000	10	*				60,000	Nov.	1886	
110	Pleasant Valley, G. S.	Cal..	10,000,000	100,000	100	10,000	Mar.	1884	.10	30,000	Dec.	1882	.05
111	Plutus, G. S. C. L.	Colo.	2,000,000	200,000	10	*				20,000	Feb.	1886	.10
112	Plymouth Con., G.	Cal..	5,000,000	100,000	50	*				2,200,000	Dec.	1887	.40
113	Prussian, S. L.	Colo.	1,500,000	150,000	10					132,000	Jan.	1883	.10
114	Quicksilver, pref., Q.	Cal..	4,300,000	43,000	100					914,150	Aug.	1887	1.50
115	" com., Q.	Cal..	5,700,000	57,000	100					151,000	July	1882	.40
116	Quincy, C.	Mich	1,000,000	40,000	25	200,000	Dec.	1862		4,610,000	Aug.	1887	1.00
117	Richmond, S. L.	Nev..	1,350,000	54,000	25	*				4,312,587	Jun.	1887	1.25
118	Ridge, C.	Mich.	500,000	20,000	25	220,000	Mar	1886	.50	100,000	Feb.	1880	.50
119	Rising Sun, S.	Dak..	750,000	150,000	5	*				52,000	May	1881	.07½
120	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*				585,000	Mar.	1886	.05
121	Robert E. Lee, S. L.	Colo	10,000,000	500,000	20					100,000	Dec.	1882	.50
122	Rooks, G.	Vt...	500,000	50,000	10	*				61,000	Apr	1885	.40
123	Savage, S.	Nev..	11,200,000	112,000	100	6,324,000	Sept	1887	50	4,460,000	July	1869	3.00
124	Security L. Mg., Mfg.	Colo.	1,000,000	100,000	10	*				50,000	July	1884	
125	Shoshone, G.	Idah.	150,000	150,000	1					7,500	Apl.	1883	.01
126	Sierra Buttes, G.	Cal..	225.000	22,500	10					1,477,245	Oct.	1887	.31½
127	Sierra Grande, S.	N. M.	2,500,000	500,000	5					860,000	Sept	1884	.25
128	Sierra Nevada, G. S.	Nev..	10,000,000	100,000	100	6,262,000	Aug.	1887	.25	102,000	Jan.	1871	1.00
129	Silver Cord, G. S. L.	Colo.	5,000,000	500,000	10					225,000	Nov.	1883	.25
130	Silver King, S.	Ariz.	10,000,000	100,000	100					2,000,000	July	1887	.25
131	Silverton, G. S. L.	Colo.	2,000,000	200,000	10	*				76,000	Nov.	1886	.02
132	Small Hopes Cons., S.	Colo.	5,000,000	250,000	20	*				3,012,500	Oct.	1887	.20
133	Smuggler, S. L.	Colo.	600,000	60,000	10					66,700	Aug.	1883	.25
134	Socorro, C	N. M.	250,000	4,000	100					4,000	Mch	1882	.00¾
135	South Yuba, G.	Cal..	2,000,000	0,000	50	*				150,000	Oct.	1881	.75
136	Spring Valley, G.	Cal..	200,000	2,000	1	50,000	Oct.	1886	.25	50,000	Jan.	1881	.25
137	Standard, G. S.	Cal..	10 000,00	1 0,000	100	25,000	Oct.	1884	.25	3.535,000	Nov.	1887	.05
138	Stormont, S.	Utah	500,000	500,000	1	*				155,000	Nov.	1881	.05
139	St. Joseph, L.	Mo..	1,500,000	150,000	10	*				814.000	Sept	1887	.20
140	Surinam, G.	D. G.	3,000,000	6 0,000	5					105,000	Nov.	1887	.05
141	Syndicate, G.	Cal..	10,000,000	100,000	100	38,729	July	1882	.15	48,308	Sept	1885	.10
142	Tip Top, S.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov.	1881	.20
143	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10
144	United Verde, C.	Ariz.	3,000,000	300,000	10	*				97.500	Feb.	1884	.20
145	Valencia, M	N. H.	150,000	1,500	100	*				37,500	Apl	1886	2.50
146	Viola Lt., S. L.	Idah.	750,000	150,000	5	*				74,500	May	1887	.12½
147	Vizina, S.	Ariz..	5,000,000	200,000	25	*				140.000	Apl.	1882	.10
148	Yankee Girl	Colo.	2,500,000	250,000	10					1,087,500	July	1887	.10
149	Yellow Jacket, G. S.		12,000,000	120,000	100	5,448,000	Dec	1885	.75	2,184,000	Aug.	1871	1.50

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par Value.	Assessments. Total levied.	Assessments. Date & am't. of last.			
1	Agassiz Cons., S. L.	Colo.	$2,500,000	50,000	$50	*				
2	Albion, S. L.	Nev..	15,000,000	150,000	100	$577,000	July	1883	.25	
3	Alloucz, C.	Mich	2,000,000	80,000	25	240,000	Feb	1884	....	
4	Alpha Con., G. S.	Nev..	3,000,000	30,000	100	460,000	Aug.	1887	.50	
5	Alta, S.	Nev..	10,080,000	100,800	100	2,027,000	Feb	1887	.50	
6	Amador, G.	Cal..		400,000	200,000	2	*			
7	American Flag, S.	Colo	1,250,000	125,000	10	300,000	Jun	1877	.50	
8	Anglo-Montana, Lt.	Mon.		600,000	120,000	5				
9	Appalachian, Lt., G.	N. C.	1,500,000	300,000	5					
10	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10					
11	Barcelona, G.	Nev..	5,000,000	200,000	25	*				
12	Bechtel Con., G.	Cal..	10,000,000	100,000	100	173,500	Jan.	1883	.10	
13	Belmont, S.	Nev..	5,000,000	50,000	100	735,000	Apl.	1886	.10	
14	Best & Belcher, G. S.	Nev.	10,080,000	100,800	100	1,900,590	Aug.	1887	.50	
15	Big Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*				
16	Bi-Metallic, S.	Mon.	5,000,000	200,000	25	*				
17	Black Jack, G.	Cal..	250,000	100,000	2½					
18	Boston Con., G	Cal..	10,000,000	100,000	100	170,000	Nov	1883	.25	
19	Bradshaw, S.	Ariz.	2,250,000	225,000	10	*				
20	Brunswick, G.	Cal..	2,000 000	400,000	5	*				
21	Bullion, G. S.	Nev..	10,000,000	100,000	100	5,050,000	Aug.	1887	.50	
22	Bve and Bye	Ariz.	1,000,000	100,000	10	*				
23	Calaveras, G.	Cal..	500,000	500,000	1	*				
24	Carisa, G.	Wy	500,900	100,000	5	*				
25	Cashier, G S.	Colo.	500,000	250,000	2	*				
26	Cen Contin'l, G. S. L.	C. & A	2,000,000	200,000	10	*				
27	Charles Dickens, G. S.	Idah.	1,250,000	250,000	5	*				
28	Cherokee, G.	Cal..	1,500,000	150,000	10					
29	Chollar, S.	Nev..	11,200,000	112,000	100	1,152,000	Aug.	1887	.50	
30	Cinnamon Mt., G. S.	Colo.	750,000	150,000	5	*				
31	Climax, S. L.	Colo.	2,000,000	200,000	10	*				
32	Colorado No. 2, S. L	Colo.	100,000	10,000	10	*				
33	Comstock, G. S.	Nev..	10,000,000	100,000	100	30,000	Mar.	1887	.15	
34	Con. Imperial, G. S.	Nev..	5,000,000	50,000	100	1,175,000	Sept	1887	.2.	
35	Con. Pacific, G.	Cal..	6,000 000	60,000	100	183,000	Sept	1887	15	
36	Cons Silver, S	Mo..	2,500,000	250,000	10					
37	**Cop. Queen Cons, C.	Ariz.	1,400 000	140,000	10					
38	Courtlandt	Colo.	500,000	50,000	10					
39	Crescent, S. L.	Colo.	3,000,000	300,000	10	*				
40	Crocker, S.	Ariz.	10,000,000	100,000	100	75,000	May	1887	.10	
41	Crowell, G.	N. C.	500,000	500,000	1					
42	Dahlonega, G.	Ga...	250,000	250,000	1	*				
43	Dandy, S.	Colo.	5,000,000	500,000	10					
44	Dardanelles, G.	Cal..	1,000,000	100,000	10	*				
45	Decatur, S.	Colo.	1,500,000	300,000	5	*				
46	Denver City, S. L.	Colo.	5,000,000	500,000	10	*				
47	Denver Gold	Colo.	300,000	60,000	5					
48	Deseret, G. S.	Utah	500,000	50,000	10	*				
49	Dunderberg, S.	Colo.	1,500,000	150,000	10	*				
50	Durango, G.	Colo.	500,000	500,000	1	*				
51	Eastern Dev. Co., Lt.	N. S.	1,500,000	150 000	10	990,000	Mar.	1886	1.00	
52	El Cristo, G. S.	U.S.C	1,000,000	500,000	2	*				
53	El Dorado, G	Cal.	1,000,000	250,000	4	*				
54	El Talento, G.	U.S.C	1,000,000	500,000	2					
55	Empire, S.	Utah	10,000,000	100,000	100					
56	Enterprise, S. L.	Colo.	800,000	80,00	10	*				
57	Eureka Tunnel, S. L.	Nev.	10,000,000	100,000	100					
58	Exchequer	Nev.	10,000,000	100,000	100	880,000	July	1887	.20	
59	Found Treasure, G. S.	Nev..	10,000,000	100,000	100	6,000	Nov.	1887	.06	
60	Gold Cup, S.	Colo.	500,000	500,000	1	*				
61	Gold Placer, G.	Colo.	5,000,000	200,000	25	229,314	Dec.	1885	.25	
62	Gold Rock, G.	Cal.	1,000,000	500,000	2	*				
63	Goodsnaw, G.	Cal..	10,000,000	100,000	100					
64	Grand Belt, C.	Tex.	12,000,000	120,000	100	*				
65	Grand Duke	Colo.	800,000	80,000	10					
66	Great Romance, G.	U.S.C	1,000,000	500,000	2	*				
67	Gregory-Bobtail, G.	Colo.	550,000	550,000	1	*				
68	Gregory Con., G.	Mon.	3,000,000	300,000	10					
69	Harlem M. & M. Co, G.	Cal..	1,000,00	200,000	5					
70	Head Cent. & Tr. S. G	Ariz.	10,000,000	100,000	100					
71	Hector, G.	Cal..	1,500,000	300,000	5					
72	Highland, C	Mich	500,000	25,000	25					
73	Hortense, S.	Colo.	2,000,00	20,000	10					
74	Huron, C.	Mich	1,000,000	40,000	25	280,000	May	1887	3 00	
75	Iron Gold & Silver, S	N. M	2,000,000	200,000	10					
76	Iroquois, C	Mich	1,250,000	50,000	25					
77	J. D. Reymert	Ariz	10,000,000	100,000	100	*				
78	Julia Cons., G. S.	Nev..	11,000,00	110,000	100	1,452,000	Apl.	1887	.10	
79	Kearsarge, C.	Mich	1 250,000	50,000	25	150,000	Oct.	1887	1.00	
80	Laclede	N. M.	2,000,000	200,000	10					
81	Lacrosse, G.	Colo.	1 000,000	100,000	10	*				
82	Lee Basin, S. L.	Colo.	5,000,000	500,000	10	*				
83	Lucerne, S.	Colo.	5,000,000	500,000	10	*				
84	Mammoth Bar, G.	Cal..	10,000,000	100,000	100	50,000	Dec.	1881		
85	Mariposa pref., G.	Cal..	5,000,000	50,000	100	1,687,500	Feb.	1883	.25	
86	" common, G.	Cal..	10,000,000	100,000	100	1,975,000	Dec.	1881	.20	
87	May Belle, G	Cal..	10,000,000	100,000	100	84,000	Mar.	1884	.1.	
88	Mayflower Gravel..	Cal..	1,000,000	100,000	10	235,000	Sept	1887	.25	
89	Medora, G	Dak.	25,000	250,000	1	*				
90	Mexican, S.	Nev..	10,000,000	100,000	100	2,615,960	July	1887	.25	
91	Middle Bar G.	Cal..	400,000	200,000	2	*				
92	Mike & Starr, S. L.	Colo	1,000,000	200,000	5	*				
93	Monitor, G.	Colo.	100,000	100,000	1	*				
94	Moose Silver, S.	Colo.	3,000,000	300,000	10					
95	Nachoochee, Lt., G.	Ga..	1,000,000	200,000	5					
96	Neath, G	Colo.	1,000,000	100,000	10					
97	Nevada Queen, S.	Nev.	10,000,000	100,000	100	80,000	Mar	1887	.50	
98	New Germany, G	N. S.		100,000	1	*				
99	New Pittsburg, S. L	Colo.	2,000,000	200,000	10	*				
100	North Standard, G.	Cal..	10,000,000	100,000	100	20,000	Nov			
101	Noonday	Cal..	600,000	60,000	10	208,000	Dec	1881	.10	
102	Oneida Chief, G.	Cal..	500,000	125,000	4	*				
103	Oriental	Nev..	2,000,000	200,000	10					
104	Oriental & Miller, S.	Nev.	10,000,000	400,000	25		Aug	1887	.25	
105	Osceola, G.	Nev..	5,000,000	50,000	100					
106	Overman, G. S.	Nev.	11,520,000	115,200	100	3,765,680				
107	Park, S.	Utah	2,000,000	200,000	10					
108	Peer, S.	Ariz.	10,000,000	100,000	100	135,000	Nov.	1886	.10	
109	Peerless, S.	Ariz.	10,000,000	100,000	100	320,000	Sept	1887	.25	
110	Phœnix	Ariz.	500,000	500,000	1					
111	Phœnix, G. S.	Ark.	5,000,000	200,000	25	*

NEW YORK MINING STOCK QUOTATIONS.

DIVIDEND-PAYING MINES.

Name and Location of Company.	Nov. 12.		Nov. 14.		Nov. 15.		Nov. 16.		Nov. 17.		Nov. 18.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon	...	.....	.90	....	....	....	....	....	....	.....	....	.....	200
Argenta, Nev	.....	.....	.....	.....	.....	....	.....	.....	....	.....	....	.....	.....
Bassick, Colo	.....	.....	....	...	.....	....	.....	.....	....	.....	....	.....	.....
Belcher, Nev	.....	.....	.....	....	.....	.....	9.25	.....	.....	.....	.....	.....	100
Belle Isle, Nev	.....	.....	.....	.....	.....	.....	.....	.80	.....	.....	.....	.....	100
Bodie Cons., Cal	...	...	.....	.....	2.25	.....	2.20	2.10	2 35	2.25	2.90	2.75	1,998
Breece, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bulwer, Cal	.....	.....	.86	.....	.....	.....	.....	.90	.....	.....	.....	.....	220
Caledonia, Dak	.....	.....	.....	.....	1.65	1.50	.....	1.65	.....	.....	.....	.....	500
Chollar, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.50	.....	.....	100
Chrysolite, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado Cent'l, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Cal. & Va., Nev.	18.25	.....	21.75	18.63	24.13	22.75	24.50	22.50	24 75	...	24.50	24.25	1,380
Crown Point, Nev	.....	.....	.....	.....	.....	.....	9.13	.....	.....	.....	.....	.....	100
Deadwood, Dak	2.65	.....	2.75	2.50	2.75	.....	2 65	2.60	2.70	2.65	2.60	.....	2,420
Dunkin, Colo	.....	.....	.....	.....	.....	.....	.85	.....	.....	.....	.85	....	1,150
Eureka Cons., Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.37	.....	50
Father de Smet, Dak	.....	.....	.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Freeland, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gould & Curry, Nev	4.30	.....	.....	.....	5.75	.....	.....	5.38	.....	5 50	.....	.....	650
Green Mountain, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	.....	.....	200
Hale & Norcross, Nev	.....	.....	.....	.....	4.70	.....	.....	4.90	.....	4.90	.....	.....	900
Helena, Mont	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Holyoke, Idaho	.....	.....	.....	.....	.09	.08	.10	.09	.10	...	.10	.09	6,400
Homestake, Dak	.....	.....	13.00	.....	13.00	12.00	.....	.....	.....	.....	.....	.....	200
Horn-Silver, Ut	.....	.....	.....	.....	.....	.....	.....	.....	.....	.80	.....	.....	100
Independence, Nev	.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Hill, Dak	.....	.....	.....	.....	.....	.....	2.85	2.50	2.75	...	.....	.....	580
Iron Silver, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Colo	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Chief, Colo	.....	.....	.....	.....	.25	.23	.....	.....	.25	.....	27	.25	900
Little Pittsburg, Colo	.....	.....	.31	.....	.....	.....	.....	.28	.....	.30	.....	.....	800
Martin White, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono, Cal	.....	.....	.....	.....	.....	.....	.....	2 00	.....	2.25	.....	.....	800
Moulton, Mont	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Nev	.92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
North Belle Isle, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ophir, Nev	.....	.....	9.25	.....	.....	.....	.....	13.25	13.00	.....	.....	.....	600
Plymouth, Cal	.....	.....	.....	.....	.....	.....	18.00	.....	18.50	...	18 25	...	220
Quicksilver Pref., Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Cal	.....	.....	5.75	5.50	.....	.....	.....	.....	.....	.....	5.75	.....	500
Robinson Cons., Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Nev	7.75	.....	8.00	.....	.....	.....	8 75	.....	9 25	.....	8.63	...	800
Sierra Nevada, Nev	.....	.....	.....	.....	.....	.....	6.25	.....	6.63	.....	.....	.....	300
Silver King, Ariz	5.50	5.00	5.00	....	4.75	...	.....	.....	.....	.....	.....	.....	250
Standard, Cal	.....	.....	1.55	...	1.60	1.55	1.60	.....	1.70	1.55	1.80	1.70	3,020
Stormont, Ut	.....	.....	.....	.....	.05	.....	.....	.....	.....	.....	.....	.....	300
Surinam, D. G	4.25	.....	.....	.....	4.50	.....	.....	.....	.....	.....	.....	.....	200
Yellow Jacket, Nev	.....	.....	.....	.....	6.25	.....	.....	.....	7.00	.....	.....	...	235

NON-DIVIDEND-PAYING MINES.

Name and Location of Company.	Nov. 12.		Nov. 14.		Nov 15.		Nov. 16.		Nov. 17.		Nov. 18.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alta, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amador, Cal	1.50	.....	1.45	1.35	1.40	.....	1.35	.....	1.30	.....	1.30	....	3,100
Am. Flag, Colo	.....	.....	.....	.....	.07	.....	.....	.....	.....	.....	.07	.....	2,500
Barcelona, Nev	.....	.....	.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Bechtel Con., Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & B'licher, Nev.	.....	.....	7.38	.....	.....	.....	.....	.....	8.88	.....	.....	.....	600
Big Pittsb'g, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brunswick	1.60	1.55	1.60	.....	1.55	....	1.60	...	1.60	.....	1.60	.....	2,900
Bullion, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cashier	.40	.37	.48	.39	.53	49	.55	.52	.56	.54	.54	.50	34,500
Castle Creek, Id	.....	.....	.09	.....	.10	.....	.12	.11	.13	.12	.....	.....	5,200
Central Ariz., Ariz.	.....	.....	.07	.....	.09	.07	.10	.....	.09	.08	.....	.....	2,500
Columbia & Beaver	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Imperial	.....	.....	.....	.....	.....	.....	2 25	.....	.....	.....	.....	.....	400
Con. Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.21	.....	500
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.....	.....	.....	.....	.02	.....	.02	.....	.....	.....	.02	.....	3,500
El Cristo, U. S. Col.	2.70	2 55	2.90	2.70	3.00	2 85	2.90	2.70	2.70	2.60	2.80	2.65	8,400
Exchequer	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.00	.....	100
Found Treasure	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hector	.....	.....	.....	.....	.74	.....	.....	.....	.....	.....	.50	.....	300
Julia, Nev	.....	.....	.65	.....	.....	.....	.80	.....	.....	.....	.75	.....	500
Kossuth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, Colo	.....	.....	.....	.....	.....	.....	.12	...	.....	.....	.12	...	2,600
Mexican, Nev	.....	.....	5.50	.....	6.50	.....	6.38	.....	6 88	.....	7.50	.....	1,000
Middle Bar, Cal	.46	.45	45	.44	.45	....	.44	....	.43	.42	.42	.....	8,600
Monitor	.....	...	.18	.....	.....	.....	.....	.....	.....	.....	.17	.....	3,000
New Pittsb'g, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Stand'd, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	100
N. Horn-Silv'r, Ut	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oneida Chief	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ont'rl'&Mil'r, Nev.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.11	.10	600
Phoenix of Arkan's	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phoenix of Arizona	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Potosi	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahann'k, Va.	.23	.22	.23	....	.23	.22	.23	.22	.22	....	.23	....	8,600
Red Elephant, Colo.	.....	.....	.02	.....	.02	.....	.....	.....	.....	.....	.....	.....	1,000
Renfrew, N. S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Saint Kevin, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Sebastian	.....	.....	.....	.....	.....	.....	.....	.....	3 50	.....	3.50	.....	400
Santiago, U. S. Col.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.05	.....	100
Security, Colo	1.50	1.40	1.50	1.38	1.45	1.30	1.63	1.38	1.63	1.45	1.60	1.37	8,800
Silver Cliff, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Leaf	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Queen, Ariz.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.04	300
Stanislaus, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State L'e, 1&4, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, Nev.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel, Nev.	.36	.35	36	.35	.39	.35	.38	.36	.37	.35	.37	.34	32,700
Taylor Plumas, Cal.	.....	.....	.....	.....	.....	.....	.02	.....	.....	.....	.02	.....	1,200
Tornado	.....	....	1 30	...	1.35	....	1.30	.....	.....	.....	.....	....	2,400
Union Cons., Nev	.....	.....	.....	.....	.....	.....	4.50	.....	5.00	4 80	.....	.....	445

*Dealt in at the New York Stock Exchange. Unlisted Securities

BOSTON MINING STOCK QUOTATIONS.

Name of Company.	Nov. 11.		Nov. 12.		Nov. 14.		Nov. 15.	Nov. 16.	Nov. 17.	Sales.
Atlantic, Mich	.....	.....	.....	.....	.....	.....	11.00	.....	.....	200
Bodie, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza D	.95	.....	.95	.....	.95	.....	1.13	.97	1.13	1.06	1.25	1.13	6,250
Boston & Mont., Mont	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Breece, Colo	.....	.....	.41	.40	.40	.....	.40	.....	.40	.....	42	.40	1,450
Calumet & Hecla, Mich	.....	.....	.....	...	200	.....	.....	202	.....	202	.....	26
Catalpa, Colo	.....	.....	.30	.....	.....	.....	.....	.26	.....	.26	.....	1,100
Chrysolite, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Virginia, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Colo	.95	.....	.90	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eureka, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin, Mich	12.00	.....	12.00	11.75	12.13	11.88	12.50	12.25	12.75	12.13	12.75	.....	1,035
Freeland, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green, Mo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Honorine, Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ironton Iron Co., Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Chief	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa, Cal	1.13	.....	.....	.....	.....	.....	.....	1.13	.....	.....	.....	.....	200
Osceola, Mich	19.00	18.50	.....	.....	.....	.....	19.25	19.00	19.00	.....	19.00	18.50	360
Pewabic, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy, Mich	52.00	51.50	.....	.....	52.00	.....	53.50	52.00	52.25	52.00	52.50	.....	191
Robinson, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra, Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.25	.....	25
Silver King, Ariz	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Stormont, Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.05	.....	500

Name of Company.	Nov. 11.		Nov. 12.		Nov. 14.		Nov. 15.	Nov. 16.	Nov. 17.	Sales
Allouez, Mich	.....	.....	1.00	.....	1.00	.....	1.00	.....	.....	500
Arnold, Mich	45	.....	.....	.....	.....	.....	.....	.....	.....	200
Aztec	.07	.....	.08	.....	.....	.....	.....	.....	.....	1,000
Blue Ridge, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bijou	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bowman Silv'r, Nev	.05	.....	.05	.....	.04	.....	.05	.....	.04	3,000
Brunswi'k	.....	.....	1.53	...	1.60	.....	1.55	.....	1.60	.....	1.60	.....	800
Cashier, Colo	.....	.....	.....	.....	.39	.....	.....	.....	.....	.....	.....	.....	300
Contentment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Pacific, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent, Colo	.09	.....	.10	.....	.09	.....	.09	.....	.09	.....	.....	.....	2,600
Cusi, N. Mex	.21	....	.20	.....	.20	.....	.20	.....	.20	.....	.20	.....	3,500
Decatur, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gogebic	.....	.....	.....	.....	8.25	.....	.....	.....	.....	.....	.....	.....	500
Huron, Mich	3.75	.....	3.75	....	.....	.....	3.50	.....	3.50	.....	3.50	.....	600
Kossuth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oriental & M., Nev	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, Va	.22	.....	.22	.....	.22	.....	.23	.....	.22	.....	.22	.....	2,600
Security, Colo	1.50	.....	1.50	.....	1.50	.....	1.50	.....	1.50	.....	1 50	.....	750
South Side	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel, Nev.	.37	.....	.36	.....	36	.....	.36	.....	.36	.....	.36	.....	1,925
Tamarack	.....	.....	.....	....	102	.....	102	.....	.....	.....	.....	.....	47
Taylor Plumas, Cal.	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Washington	.....	.....	.....	.....	.....	.....	.15	.....	.....	.....	.....	.....	500

New York: Dividend shares sold, 26,333. Non-dividend shares sold, 136,945 Total New York, 163,278.
Boston: Dividend shares sold, 11,837. Non-dividend shares sold, 19,822. Total Boston, 31,659.

COAL STOCKS.

Name of Company.	Par value of shares.	Nov. 12.		Nov. 14.		Nov. 15.		Nov. 16.		Nov. 17.		Nov. 18.		Sales.
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Barclay Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cameron Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ches. & O. RR	100	.....	.....	2⅞	...	2½	2¼	3	2⅛	.....	.....	3¼	3	800
*Chic. & Ind. Coal RR	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col. & Hocking Coal	100	31½	30¾	32⅝	31	33⅝	32¼	33⅝	32¾	33⅜	31⅞	32⅝	32	37,095
Col., C. & I	100	37	34½	39	37	39¼	38	39	37¾	39	38	38	37	12,890
Consol. Coal	100	.....	.....	.....	.....	.....	.....	24	.....	25	.....	.....	.....	250
Cumb. C. & I	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Del. & H. C	100	103⅜	103	104⅛	103⅜	104⅛	103¼	104¾	103⅞	104⅞	104	104¾	103⅝	9,292
D., L. & W. RR	50	130½	129⅞	132⅜	130¼	133¼	132	134	132¾	134¼	133¼	134⅛	133¼	162,869
Elk Lick Coal Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hocking Valley	100	27⅜	25	27⅜	25¾	26½	25¾	27	26¼	27¼	26¾	26¾	.....	7,935
Lehigh C. & N.	50	46¾	46¼	47	46⅝	46¾	.....	47	.....	47	.....	.....	.....	748
Lehigh Valley RR.	50	56	.....	56	55⅞	55⅝	55½	55¾	55½	55½	.....	...	.....	441
L. & W. C. & I. Co	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marshall Con. Coal	100	.....	.....	10	9	.....	.....	.....	.....	.....	.....	.....	.....	400
Maryland Coal	100	15	.....	.....	.....	16	.....	16	.....	.....	.....	.....	.....	400
Montauk Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morris & Essex	50	.....	.....	137	135⅞	.....	.....	.....	.....	136	.....	.....	.....	320
New Central Coal	100	14½	.....	.....	.....	15	.....	.....	.....	.....	.....	.....	.....	300
N. J. C. RR	100	76½	75¾	77¼	76½	78½	76¾	79⅝	78½	80	78½	80	79	28,078
N. Y. & S. Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y., Susq. & Western	100	9⅞	9⅝	10⅛	9¾	10	.....	10¼	10	10⅛	9¾	.....	.....	5,120
Do. pref	100	32	31¼	32¼	31¾	32½	32	33	32½	32⅝	32	32¼	.....	10,175
N. Y. & Perry C. & I	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Norfolk & Western R R.	100	.....	.....	16	.....	16½	16	17	16¾	17	.....	17	.....	1,270
Do. pref	100	42½	41⅞	42⅞	42¼	43	42½	44	42¾	43¾	43	43⅝	42⅝	22,906
Penn. Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penn. RR.	50	55⅛	55	55½	55	55⅜	55⅛	55½	55¼	55⅝	55½	.....	.....	10,977
Ph. & R. RR.	50	68¼	67½	70½	68⅞	70	69	71⅝	69⅞	71½	70⅜	71⅝	70½	593,448
Spring Mountain	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee C. & I. Co	100	.....	.....	28½	27½	31	28½	31¾	30⅜	31¼	30¼	30¼	29½	18,440
Westmoreland Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

** Of the sales of this stock, 134,263 were in Philadelphia, and 459,185 in New York.
† The quotations for these stocks are not percentage, but actual price.
Dealt in at the New York Stock Exchange, Unlisted Securities.

Total sales, 777,574.

San Francisco Mining Stock Quotations.

Company.	Closing Quotations. Nov. 11.	Nov. 12.	Nov. 14.	Nov. 15.	Nov. 16.	Nov. 17.	Nov. 18.*
Alpha	.....	.....	.....	.....	.....	.....	.....
Alta	3¼	3	3.70	3.20	3.20	3.15	.....
Argenta	.....	.....	.....	.....	.....	.....	.....
Belcher	.....	.....	.....	.....	.....	.....	.....
Belle Isle	.60	.75	.70	.75	.70	.60	.....
Best & Bel	6⅞	7	8½	8⅜	8⅛	8¼	.....
Bodie	2	.....	2	2	2.15	2.60	.....
Bulwer	.85	.85	.90	.90	.90	1.00	.....
Chollar	5⅞	6	6¾	6⅝	6⅝	6⅜	.....
Com'nwlth	2½	.....	2½	2½	2½	2¼	.....
Con. C. & V.	18⅞	18⅝	.....	23½	24⅝	24	.....
Con. Pac	.....	.....	.....	.....	.....	.....	.....
Crown Pt	8½	8½	9	9⅛	9¾	9¼	.....
Eureka C	.....	.....	7	6⅞	6¾	7	.....
Gould & C	4.45	4½	5⅛	5	5¼	5¼	.....
Hale & N	4¼	4.20	4.40	4.95	5	4.90	.....
M. White	.....	.....	.....	.....	.....	.....	.....
Mexican	5⅛	5¼	6¼	6⅛	6⅞	7¼	.....
Mono	2	1.90	1.90	1.90	2	2.10	.....
Mt. Diablo	4¾	.....	4¾	.....	.....	.....	.....
Navajo	.95	.90	.....	.90	.90	.85	.....
Nev. Queen	3.85	3.80	3.85	3.85	3¾	3.10	.....
N. Belle I	8⅞	.....	9	.....	12⅝	12	.....
Ophir	8⅞	9⅛	11¼	11	9⅛	9	.....
Potosi	6⅝	7⅜	6⅞	7¼	7⅛	6⅞	.....
Savage	7¾	7¾	8⅜	8½	8⅞	8½	.....
Scorpion	.....	.....	.....	.....	.....	.....	.....
Sierra Nev.	6	5⅝	7	6⅜	6¾	6½	.....
Sutro Tun	.....	.....	.....	.....	.....	.....	.....
Tip Top	.....	.....	.....	.....	.....	.....	.....
Union Con.	4.20	4¼	4.70	4.65	4¾	4¾	.....
Utah	2 30	2.40	2.55	2 45	2½	2.40	.....
Yellow Jkt.	5¾	5¾	5⅞	5⅝	6⅝	6¼	.....

* No quotations.

as heretofore. But there is no doubt that present prices will be maintained, with a tendency to a little higher figures; $32 at eastern mills is regarded as the lowest figure at which a profit can be made, and some of the mills can not manufacture at that price. The allotment schedule was unchanged, the general feeling being that the orders in sight are sufficient to employ the mills some time ahead on the present basis.

Other meetings have been those of the Merchant Steel Association of the United States in this city last Friday, to which we alluded last week, and of the Bessemer Merchant Steel Association, at Pittsburg, on Tuesday. These are not conflicting organizations.

The former is composed of crucible and open-hearth steel makers, and the latter of makers of Bessemer merchant steel. Both associations have arranged to meet in Pittsburg December 1st, and will hold a joint meeting and act together in making classifications and fixing prices and extras. The principal makers of the various brands of merchant steel are represented in both organizations.

American pig-iron is unchanged, foundry brands remaining scarce and in demand. Present prices are unchanged. The present outlook appears to be that favorite brands of No. 1 foundry iron will be a little higher in price in the spring, while No. 2 and foreign brands are not likely to advance. New sales of small lots are constantly reported, but we do not observe any further disposition to anticipate wants. We note a new sale of 2500 tons domestic Bessemer pig on private terms, lower than our last quotations.

We do not learn of any new business in spiegel, or in Bessemer blooms and billets, on all of which quotations are nominal.

New sales of steel rails from Eastern mills are reported, amounting to about 7000 tons for early delivery.

Old Tee Rails have been freely offered at $22 in moderate lots without buyers. On the other hand, holders of lots in store are firmer in price, and strong parties will store rather than sell at present prices. The Italian mills are buying largely in anticipation of the increase of duty on old rails March 1st. A private cable message from Amsterdam to-day reports the sale for Italian account of 2000 tons at a price equivalent to $23.25 c. i. f. New York.

Philadelphia. Nov. 17.

[From our Special Correspondent.]

This week's steel rail meeting has been the most important event in the steel rail trade for many months. Up to this hour nothing definite is known as to the course agreed upon. The Board of Control has now the matter in hand and will report in a few days. There seems to be a wide difference in steel rail quotations, which range in price from $31.60 to $34. The lowest admitted sales in this market are $32.50 Makers here say the quotations hereafter will be $33 to $34. Before the recent meeting was held options were given at $32.50 to $33, and have not, as yet, been withdrawn. The total amount of steel rails under inquiry will foot up about 250,000 tons. There are several very large buyers who have not as yet been heard from, but if they purchase it will increase these figures somewhat. It is a question with a great many buyers whether the syndicate will be able to maintain the position it has assumed. There are some who believe that notwithstanding the present determination to hold prices where they are, mills enough will be found to shade prices down to $31.

The measure adopted, namely, to divide business with the weaker companies who have been cutting prices, will no doubt help a good deal to prevent the downward tendency. All the trunk line companies want a good deal of material and will place their orders soon. There are also Pacific Coast and Gulf Coast inquiries in the market. The American makers feel quite confident of their ability to hold the home market against foreign importations.

There is very little indeed new in the old material market. Old rails sell as usual, but a little more freely at $22 to $22.50. Several large lots have been ordered, and as soon as they come they will be held for $23 to $23.50, even though buyers do not come into the market all winter. There are several inquiries in for small lots of structural iron, but there is nothing new either in trade or prices. Skelp iron is quite firm and wrought iron pipes of all sizes are ordered away ahead. The bar mills all through the State are right well supplied with business. Prices are firm at the usual quotations. A dull week's business in nails has been reported, and prospects are not very bright. Muck bars are selling along every day in a hand to mouth way at $30.50 to $31. Crude iron is selling at the usual figures, and there is nothing new in the situation to impart any special interest to the trade. Foreign material is neglected, and brokers report it impossible to place large lots at present prices. It is figured up that there will be eight or ten furnaces out of blast within the next two or three weeks. This is to a certain extent a matter of rumor. Several companies are barely making cost, and do not feel inclined to crowd productions on that account. Foundry irons of special brands are scarce. For prices we refer to our weekly register of current quotations.

Pittsburg. Nov. 19.

[From our Special Correspondent.]

The dullness we noted in our last in the iron trade continues, the market being even weaker than last week, with buyers less inclined to operate, notwithstanding the fact that the stocks of rail iron are known to be small in the hands of consumers. Sales continue very much restricted, and most descriptions of metal can be obtained at a shade lower prices than were current last week. If bottom prices have not been reached, it must be very near that point. At this time it looks as if there was but little chance for a revival of trade until after the advent of the new year.

There appears to be a very conservative feeling among iron men generally, they have but little to say; while some speak hopefully of the future, others prefer not to give an opinion. At the same time there appears to be no falling off in consumption, which has been enormous for some time. One thing is very evident, as consumers confine their purchases to small amounts they will have to buy oftener, which in the end will amount to pretty much the same thing. The market is being watched very closely. Large consumers are particularly interested.

Special and favorite brands show less decline than other descriptions. Buying has been curtailed during the week to the extremest limits possible, and the disposition to hold off seems to be increasing. This is due in a measure to the belief that prices will be no higher in the near future.

Old Rails are going a begging for purchasers; prices nominal. Bessemer can be bought under last week's prices. Scrap material fails to find purchasers to any extent. Steel billets weaker; not quotable lower.

Muck bar dull; without change.

The coke question shows no change in the situation. The new scale will contain the following: The right being reserved to the operators that they shall employ any person or discharge any one for cause; but no one shall be discharged because he is a member of any labor organization. The week's prices will be found in our weekly register of current quotations.

SALES SINCE OUR LAST REPORT.

Coal and Coke Smelted Lake Ore.

500 Tons Standard Bessemer	19.50 cash
300 Tons Gray Forge	17.25 cash.
100 Tons No. 2 Foundry	19.00 4 mo.
125 Tons No. 1 Foundry	20.75 4 mo.
300 Tons White and Mottled	16.75 cash
100 Tons No. 1 Foundry, all ore	20.50 cash.
125 Tons No. 2 Foundry, all ore	19.50 cash.
75 Tons No. 1 Foundry	21.00 4 mo.
25 Tons No. 2 Foundry	18.50 cash.
100 Tons Bessemer	20.00 cash.

Coke, Native Ore.

300 Tons Gray Forge	17.25 cash.
125 Tons Gray Forge	17.25 cash.
100 Tons Silvery Foundry	20.75 4 mo.
250 Tons Gray Forge	17.25 cash.
125 Tons Mottled and White	16.50 cash.
60 Tons No. 2 Foundry	19.00 4 mo.
50 Tons No. 2 Foundry	19.50 cash.
50 Tons Gray Forge	16.75 cash.
50 Tons Gray Forge	17.75 4 mo.
50 Tons Gray Forge	17.25 cash.
50 Tons Mottled	16 75 cash.

Steel Billets.

500 Tons Billets	30.25 cash.

Muck Bar.

500 Tons Muck Bar	31.00 cash

Louisville. Nov. 15.

[Reported by GEO. H. HULL & Co.]

The Louisville market remains practically as it was last week. Negotations for some large sales are now being made, which have been inaccessable heretofore, and it is expected will be sold within the regular prices quoted in our last. Reports have been current that some large sales of mill iron have been made below the regular prices, but no weakening effects have been felt, and orders cannot now be placed at the same figures. The immense freight traffic now being carried on by Southern and Western railroads, indicates a good winter's business for the country, which can not fail to sustain the iron business. This rush of freight causes cars to be scarce, and prevents a prompt handling of iron shipments, and as a consequence, buyers have had to shut down because their iron could not be transported quickly enough to keep them supplied. These buyers are those who in our former reports have been characterized as buying from hand to mouth, and their present difficulties have been expected and foreshadowed in these reports. Prices remain unchanged. Current quotations for cash will be found in our weekly register of prices.

FINANCIAL.

NEW YORK, Friday Evening, Nov. 18.

The Condition of Trade.

The condition of general trade is fully as good as it was one week ago, in all directions, and at a few points it shows signs of some improvement, which is a direct result, in most instances, of seasonably cold weather. Grain, flour, cotton, petroleum, and copper have advanced; hog products, in sympathy with Indian corn and sugar, owing to continued strength abroad. Coffee is less certain of its position. Exports of breadstuffs have increased moderately from the Atlantic ports, and very largely from the Pacific coast as compared with last week. The industrial situation has not improved materially, although the probable early resumption of work by striking Philadelphia shoemakers, the decision of glass factory employés not to strike, and the practical failure of the second strike of the sugar plantation hands (colored) in Louisiana go far to brighten the outlook. The Connellsville coke burners, too, have apparently thought better of their expressed intention to strike for an advance.

There is, however, no improvement of the situation in the Lehigh region, where over 20,000 miners continue on strike for higher wages, which the employers declare they will not grant. The latter state in the daily papers that they will continue to refuse to grant the higher scale demanded. but that they will refuse to employ competing labor in the mines; they explain that they will hold out until the strikers confess themselves beaten and are ready to go back to work at the old rate of wages. This makes the prospect for the strikers a very dismal one, as evictions from company houses for non-payment of rent have begun. Relief funds contributed by Schuylkill and Wyoming region miners are insufficient, and starvation appears to be staring many of the strikers and their families in the face. The prospective failure of the strike in the Lehigh points to the withdrawal of the 8½ per cent advance in wages granted in the Schuylkill, which colors the whole situation, so far as the Pennsylvania anthracite miner is concerned, very dark. The only silver lining noticeable at this time is found in the full time at all mines where work is being carried on, which, of course, enables the miners so employed to earn much better wages than they have been able to secure for some years past. This may be the better understood when it is recalled that not over two-thirds time has of late years been observed in the anthracite regions, Sundays excepted. The actual work done at the mines will explain why, notwithstanding the strike, the total production (shipments) of coal this year, to October 31st, is in excess of 2,000,000 tons over the total of shipments in a like portion of last year.

The demand for anthracite coal in all directions is in excess of the supply, and stocks at tidewater are very much reduced of late. Stocks of coal, usually carried from season to season by the coal roads upon sidings at various stations near recognized points of accumulation, and which, though not appearing in official reports of stocks, amount to a very considerable quantity, are very low indeed, lower than they have been for years. This is noticeable in the vicinity of New York.

There is a moderate gain in tone to the pig iron market, more particularly reported from New York City, for best grades of Lehigh, and at St. Louis, owing to several large sales of late for 1888 delivery. But there is no improvement in prices. Less is heard of sales of Southern pig-iron at the East, and receipts of Scotch pig continue very light, although prices have been shaded a little owing to reduced quotations abroad. There is little inquiry at present for foreign Bessemer, although old material is somewhat stronger.

The latter feature is due largely to a better demand abroad. The meeting of the steel rail makers, which was "held with closed doors," is officially explained as showing a good deal of confidence in the situation on the part of the rail makers themselves, who, it is alleged, propose to maintain prices somewhere about $32.50 in any event, and who deny that sales at $31 or at $30 have taken place at all.

The money market is firm and tends upward, owing to increased calls for funds in all speculative markets, and at New York call rates for funds ranged at 4@4½, while those for time or approved paper are quoted at 5@6. London Exchange, sight is held at $4.85@ $4.85¼.

The Coal Road Stocks.

The New York stock market has experienced something in the nature of a boom, and prices have sustained a material advance, notably Western Union, 2⅝ points; Reading, 3¾; Delaware & Hudson, 1⅝; Delaware, Lackawanna & Western, 3¾, and Jersey Central, 3¼ points. Other shares have been affected, Hocking Valley (railroad) advancing 1¼ points, and Hocking Valley Coal and Iron 1¾ points. The temper of this market, aided largely by the boom in Reading and strong foreign buying, is quite bullish.

Mining Stocks.

The market for mining shares has shown more than the usual degree of steadiness since our last. This, of course, is a natural result of the improvement in prices at San Francisco. Many are of the opinion that the present hardening process is to continue indefinitely and wind up with a big boom along the whole line, some even predicting such a condition of affairs before the close of the year. The facts, however, do not warrant any such movement within so short a period. While prices have in some instances shown a gain, a glance at the column of quotations reveals the fact that the improvement is confined to but few stocks. There has been considerable inquiry from other cities and more interest has been shown by the general public, many of whom are doubtless prepared to take an interest, as soon as it appears that the forward movement has begun in earnest.

It is with great regret we note the announcement that a receiver was appointed for the firm of Moore, Benjamin & Co., of Milwaukee, on the 15th inst. It will cause a great sensation in the Gogebic mining circles, and though we trust it is only a temporary suspension, it is likely to have a very injurious effect on Gogebic stocks.

Messrs. Moore, Benjamin & Co. have under their control some excellent mining property, but their own unwavering and too sanguine faith in the future of these mines, together with the disinclination of their associate stockholders to provide the working capital necessary even for good mines, has imposed a heavy load upon them. In their own interests we trust the stockholders of the several companies will now come forward and provide the money necessary to redeem their properties, and in so doing relieve the embarrassment of this firm, which has been the strongest supporter of their interests in Gogebic stocks.

Those Tortilita schemers have failed to appear before the Mining Board at the Consolidated Stock and Petroleum Exchange to answer such inquiries as the committee of the Exchange determined to propound to the floaters of the bubble some weeks since. It will be remembered that the Tortilita counsel some weeks ago plead absence of the president as a cause for a postponement of a hearing, which was granted, as a matter of courtesy. It now transpires that on the day

fixed for a peremptory hearing Mr. President Reall was again conspicuous by his absence. It is now stated that at an early date that gentleman or some other competent official of the company will be prepared to appear and undergo the terrors of the inquisition. It is to be hoped that there will be no further trifling, that no further delays will be accorded, and that the committee of the Exchange will in the event of a failure of the Tortilita people to present themselves, strike their stock from the list without further delay, and thus give innocent stockholders an opportunity of gauging the value of their investments.

Homestake declined from $13 to $12. Father de Smet shows only one sale at 40c. Iron Hill shows a larger business. The transactions amounted to 530 shares. The price declined from $2.85 to $2.50. Caledonia was also active at from $1.50 to $1.65.

Surinam has declared another dividend, on the strength of which the price advanced from $4.25 to $4.50.

The dealings in Rappahannock have not been as ctive as last week. The price was firm at from 22@23c.

Considerable activity was displayed in Silver King, which declined from $5.50 to $4.75.

The grand old Ontario has declared its usual monthly dividend of $75,000, making a grand total to date of $8,750,000. No sales of the stock are reported this week. Some 300 shares of Stormont sold at 5c. per share.

Castle Creek received some attention, and went from 9c. to 13c. Holyoke was quiet and firm at 9@10c.

Considerable interest has again been shown in El Cristo, and the price in the beginning of the week advanced from $2.55 to $3. Toward the close it declined, and to-day sold at $2.65.

The price of Standard Consolidated is steadily advancing. The prospects at the company's property are said to be good, and an extra Christmas dividend is spoken of. The price ruled at from $1.55 to $1.80. Bodie Consolidated also shows an upward movement, going from $2.20 to $2.90. Bulwer was quiet at from 86c. to 90c. Mono at from $2 to $2.25.

Brunswick continues to be firmly held and much higher prices are predicted. Sales were made at from $1.55 to $1.60. Amador shows lower prices—going from $1.50 to $1.30, and Middle Bar from 46c. to 42c. Hector does as yet not show the upward movement that was predicted for this stock, sales were made at from 74@50c. Plymouth was quiet at from $18@$18.2 . Quicksilver common at from $5.50@$5.75. Taylor Plumas was almost entirely neglected, and sold at 2c. Green Mountain at 5c.

An improvement in the ore development of Consolidated California & Virginia is reported, and in consequence the price advanced from $18.25@$24.75. All the other Comstock shares show an upward tendency. Yellow Jacket also shows higher prices, advancing from $6.25@$7, Sierra Nevada from $6.25@$6.63; Savage from $7.75@$9.25. declining to-day again to $8.63. Ophir from $9.25@$13.25. Hale & Norcross from $4.70@$4.90. Gould & Curry from $4.30@$5.75. Crown Point at $9.13. Cholar at $6.50. Belcher at $9.25. Union Consolidated from $4.50@$5.00. Mexican from $5.50@$7.50. Best & Belcher from $7.38@$8.88. Sutro Tunnel was strong, some 32,700 shares changing hands at from 34 to 37c.

The Tuscaroras were neglected. Navajo is quoted at 92c., Belle Isle at 80c. Found Treasure has levied an assessment of 6c. Only 100 shares of the stock were sold at $2 per share. Tornado shows the largest business, at from $1.30 to $1.35.

Eureka shows one sale to-day at $7.37.

Cashier, which has been dormant for many weeks, shows the largest business on the list this week, the transactions amounting to 34,500 shares. The price advanced from 37c. to 56c. Security continues to attract some attention, and several thousand shares changed hands at prices ranging from $1.37 to $1.63. Red Elephant sold at 22c. Monitor, at 17@18c. Lacrosse, at 12c. Little Pittsburg, at 28@31c. Little Chief, from 22@27c. Dunkin, at from 70@85c.

Two hundred shares of Alice sold at 90c. per share. It is reported that operations will be resumed at this company's property.

Meetings.

The annual and special meetings of the following companies will be held at the times mentioned:

California Water and Mining Company, No. 47 Broadway, New York City, December 1st, at twelve o'clock noon.

Dividends.

Atlantic & Georges Creek Consolidated Coal Company has declared a dividend of seven and one half cents per share, or $7500, payable December 1st, at No. 206 East Baltimore street, Baltimore, Md.

Big Vein Coal Company of West Virginia has declared a quarterly dividend of four cents per share, or $4000, payable November 16th, at No. 21 South Gay street, Baltimore, Md.

Chicago & Indiana Coal Railway Company has declared a quarterly dividend of one and one half per cent upon preferred stock, payable December 5th, at the Metropolitan Trust Company, No. 35 Wall street, New York City.

Daly Mining Company, of Utah, has declared dividends Nos. 8 and 9, of twenty-five cents per share each, or $75,000, payable November 30th, at the transfer-agency of Messrs. Lounsbery & Co., No. 15 Broad street, New York City.

Gypsey Queen Mining Company, of New Mexico, has declared monthly dividend No. 2, of five cents per share, or $2000, payable November 21st, at Louisville, Ky., and at the New York Agency of Thomas H. Wagstaff, No. 18 Broadway.

Eclipse Mining Company has declared a dividend No. 2, of one dollar per share, or $10,000, payable November 10th.

Homestake Mining Company, of Dakota, has declared dividend No. 112, of twenty cents per share, or $25,000, payable November 25th, at Messrs. Lounsbery & Co., 15 Broad street, New York City.

Morning Star Consolidated Mining Company, of Colorado, has declared dividend No. 30, of twenty-five cents per share, on $25,000, payable November 17th at Room 34, No. 53 Broadway, New York City.

Ontario Silver Mining Company, of Utah, has declared a dividend, No. 138, of fifty cents per share, or $75,000 payable November 30th, at Messrs. Lounsbery & Co.'s transfer-agency, No. 15 Broad street, New York City.

Pennsylvania Manufacturing, Mining and Supply Company has declared a dividend, No. 6, of one per cent, payable December 1st, at Nos. 1004–1006 Penn avenue, Pittsburg, Pa.

Philadelphia (Natural Gas) Company has declared dividend No. 25, of one per cent, on $75,000, payable November 25th, at No. 935 Penn avenue, Pittsburg, Pa.

Surinam Gold Mining Company, of Dutch Guiana, has declared dividend No. 4, of five cents per share, or $30,000, payable November 21st, at Room 43, Drexel Building, Wall street, New York City.

Assessments.

Company.	No.	When levied.	D'l'nq't in office.	Day of sale.	Am'nt per share.
Atlantic Cons., Nev..	6	Oct. 18	Nov. 21	Dec. 8	.10
Bunker Hill, Cal.....	19	Sept.19	Oct. 31	Nov. 28	1.00
Como-Eureka, Nev...	2	Sept.10	Oc.. 18	Nov. 26	.06
Elk Mt., Dak.....	4	Nov. 8	Dec. 8	Dec. 28	.00²½
Found Treasure, Nev	1	Nov. 5	Dec. 10	Dec. 30	.06
Golden Fleece Cal..	11	Oct. 15	Dec. 7	Jan. 4	10.00
Golden Prize, Nev ...	8	Oct. 4	Nov. 4	Dec. 5	.40
Gould & Curry, Nev..	57	Oct. 28	Dec. 2	Dec. 27	.50
Guadalupe, Cal . ..	2	Oct. 21	Nov. 25	Dec. 12	.05
Heath, Idaho	2	Nov. 4	Dec. 10	Dec 30	.05
Himalaya, Utah.....	2	Oct. 10	Nov. 19	Dec. 12	.005
King of the West, Ida.	2	Oct. 19	Nov. 23	Dec. 10	.15
Mayflower, Cal... ..	38	Sept.27	Nov. 1	Nov. 22	.25
Missoula, Utah	2	Oct. 11	Nov. 15	Dec. 5	.02
Mono, Cal	24	Sept.15	Oct. 20	Nov. 21	.50
Mutual, Dak.....	3	Oct. 3	Nov. 12	Dec. 12	.01
Oxford, Dak	1	Nov. 5	Dec. 6	Dec. 26	.01¼
Pioche Cons., Nev...	3	Sept.14	*Nov. 7	*Nov26	.10
Prior, Dak.....	1	Oct. 11	Nov. 11	Nov. 28	.002
Rochester, Utah....	..	Sept.19	*N'v.20	*Dec. 5	.05
Scorpion, Nev	22	Oct. 7	Nov. 11	Dec. 5	.10
Seabury-Calkins, Dak.	7	Oct. 27	Dec. 1	Dec. 20	.01¼
Segreg. Iron H., Dak	2	Oct. 17	Nov 20	Dec 7	.01
Sugar Loaf Hill, Dak	2	Oct. 17	Nov. 17	Dec. 3	.001
Taylor Plumas, Cal..	†2	Oct. 17	Nov. 20	Nov. 20	.02
Union Cons., Nev....	36	Nov. 12	.....	... ...	.50
Utah, Nev..... ...	2	Aug. 10	Sept.12	Oct. 29	.25
Virginia Creek, Cal..	4	Sept.27	Nov. 1	Nov. 30	.05

* The delinquent day and the day of sale were postponed to dates given above.

† The assessment of five cents per share, levied August 8th, has been rescinded.

Pipe Line Certificates.

Messrs. Watson & Gibson, brokers, 49 Broadway, report as follows for the week :

The petroleum market this week has been around 74c. The full effect of the shut-down movement has not been felt, as at the moment it went into force the white-sand pool at Saxonburg opened up. It is not in under the producers' shut-down arrangement, and hence it interferes with their plans. There is some short interest in the market, and prices are better, and we look for higher-priced crude.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange :

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov.12	73¼c.	74⅛c.	73¼c.	73⅞c.	656,000
14	74⅝	75⅛	74⅛	74½	2,095,000
15..	74⅝	74⅝	73⅜	73⅞	1,298,000
16..	74¼	74⅝	74⅛	74⅝	747,000
17..	75	75⅝	74¾	74⅞	2,278,000
18.. ...	75	75½	74	74⅝	2,039,000
Total sales in barrels.....					9,113,000

Boston Mining Stocks. Nov. 17.

[From our Special Correspondent.]

The market for copper stocks was dull and heavy in the early part of the week, but on the advance of ingot again to over 12c., there was a little better feeling, and orders were more plenty to buy the good stocks, which stiffened up prices somewhat from the recent low rates; but there is not much vim to the market, and outsiders do not take hold of it as if they expected a decided advance in the rear future. Calumet & Hecla advanced to $202 for small lots, but was down to $200 to-day again, and does not seem to be very strong at this price.

Tamarack declined $100, with sales at $102. We clip the following from the Boston *Transcript*, which may be of interest to stockholders in the Tamarack :

There are rumors in the air that a "plum" may be forthcoming one of these days to Tamarack stockholders in connection with section No. 11 (northeast part), where the company owns a large amount of land—440 acres in all. The easterly part of this land can be reached by a shaft of the same depth as that of the present working shaft of the Tamarack. It is supposed by those fully conversant with the "lay of the land" that the ground underlying it is fully equal to, if not better than any other part of the Calumet & Hecla lode, which seems to gain in richness as it gains in depth. Consequently, it is almost certain that a new mine opened on that part of the Tamarack would prove fully as rich as No. 5 Calumet shaft (the farthest shaft north), and equal to the best ground opened by the Calumet and superior to the South Hecla, from which so much of the product of the Calumet & Hecla has been taken of late. Whether this piece of land will be set off from the Tamarack proper, capitalized and the shares given as a stock dividend to Tamarack shareholders, or whether they will be allowed to subscribe pro rata, is not yet decided, but the former is the more probable.

Quincy advanced to $53½ and receded to $52@$52¼, with larger sales than usual of this stock.

Franklin advanced to $12¾ and held the advance with a good demand for it.

Atlantic sold at $11, a decline of $½ from last sale.

Osceola declined to $18½, advanced to $19¼, but was lower to-day and sold at opening price, $18½.

Huron sold at $3¾.

Gogebic Development Company advanced $⅛, with sales at $8¼.

In silver stocks, Catalpa sold at 30c. Dunkin declined to 95c. Breece sold at 40@41c. Bonanza, in early dealings, sold at 95c., but later became quite active and advanced to $1¼, closing at the highest price for the week. "Cusi" steady at 20c., which seems to be bottom price for the present.

The Eastern Development Company, Limited, the mines of which are located in Nova Scotia, is now offering 7 per cent mortgage bonds. A liberal stock bonus will be given with the bonds. For further particulars we refer to the advertisement published elsewhere.

Financial Statements of Mining Companies.

The following statement shows the financial standing of the different mining companies on November 1st :

CASH ON HAND.

Alpha Con.....	$12,607.07	Independence ...	$6,388.51
Alta	15,220.48	Imperial.....	11,498.36
Andes..... ...	17,322.17	Julia.....	963.69
Belcher.....	28,465.26	Justice	16,500 00
Benton Con.....	11,785.50	Kentuck.....	894.25
Best & Belcher..	19,390.51	Lady Washington	13,647.21
Bodie..... ...	56,990.42	Mexican	12,348.75
Bulwer.....	18 519.00	Mono.....	23,756.40
Bullion..... ...	41,372.39	Navajo	.....
*Con. Cal. & Va.	91,542 33	‡North Belle Isle	31,677.47
Con. Imperial...	11,498.36	Occidental.. ...	4.136.56
Challenge	15,431.69	Orleans.....	1,941.40
†Chollar..	16,016.84	§Overman.....	44,975 31
Crocker	7.015.29	Ophir..... ...	26,636 78
Crown Point ...	....	Peer.....	5 129.45
Dudley.....	1,262.15	Peerless	24,659.82
Eureka Con.. ..	71,000.00	Pondere.....	2,135.43
***Elko.....	1,735.85	Sierra Nevada..	11,778.67
Exchequer	14,554.49	**Standard.....	62,795.68
Found Treasure.	409.37	Syndicate	11,115.59
Gould & Curry..	2,196.91	Trojan.....	4,706.50
Head Center	1.303.62	Union Con.....	4,310 63
Head Center & Tranquility....	6,713.53	Utah Con... ..	10,606.12

* Cash in bank and unsold bullion on hand of the value of $99,338.09, not including $40,237.24 received November 2d, and the final shipment representing the clean-up for that month yet to be heard from. The expenses of the mine for October (with the exception of the sum disbursed in payment of employés in the mine). † In cash at the local office, with an overdraft for $8329.39 in Nevada Bank, San Fransico, to be deducted. *** In cash and bills receivable for $286. § Less October expenses at the mine, which are unpaid. ** In cash and $22,039.89 in unsold bullion. ‡ In unsold bullion and bills receivable for $25,000. To offset this there is an overdraft at the bank for $17,929.99.

INDEBTEDNESS.

Belle Isle.....	$21.457 85	Nevada Queen..	49,670.25
Commonwealth.	19,936.98	Mount Cory.....	41,781.49
Con. Pacific.....	1,432.00	Potosi..... ..	11,741.22
Crown Point	3,603 60	Sitka.....	4.343.00
Grand Prize	33,361.73	Savage.....	36,541.63
Hale & Norcross	9,614.29	Segregated	
Holmes.....	6,127.47	Belcher	4.989.94
**J. D. Reymert.	21 358.13	*Scorpion.	708.26
†Navajo	8,750.73	Tuscarora.....	263.39
Navajo Queen...	264.27		

* With an assessment of ten cents per share now pending. † Overdraft at bank, also outstanding drafts of $250.75. ** Since November 1st this company has received $2,411.15 in bullion.

OFFICE DALY MINING COMPANY, MILLS BUILDING, 15 BROAD STREET,

NEW YORK, Nov. 18, 1887.

DIVIDENDS NOS. 8 AND 9.

A dividend of $75,000, being FIFTY CENTS per share, has been declared, payable on the 30th inst.

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OFFICE ONTARIO SILVER MINING COMPANY, MILLS BUILDING, 15 BROAD STREET,
NEW YORK, Nov. 18, 1887.

DIVIDEND NO. 138.

The regular monthly dividend of FIFTY CENTS per share has been declared for October, payable at the office of the company, San Francisco, or at the Transfer-Agency in New York, on the 30th inst. Transfer-books close on the 25th inst. LOUNSBERY & CO., Transfer-Agents.

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